USE AND MISUSE OF PEOPLE

A.K. DASGUPTA

USE AND MISUSE OF PEOPLE—THE INDIAN CASE

EDUCATION AND UTILIZATION OF MANPOWER FOR ECONOMIC DEVELOPMENT

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PREFACE

A selection of papers written by the author during the last few years on the subject of development of community's life and the role of people in the process has been put together in this publications. These papers were written for presentation in various seminars where these were discussed.

These papers have been put together for elaborating a simple theme. Economic growth in human societies is a natural process, derived out of the process of growth of individuals in the societies. Men are born as children, and grow up to a certain age naturally and acquire increasing physical strength and vigour, and capability. After the physical growth is arrested, capability of an individual continues to grow (till senility sets in) drawing strength from his experience and this mental faculty to correlate experiences. Men also have the faculty to learn from the experiences of others which is crystallized in technological development in one form and thus the growth of capability of the individuals in the society can occur at very high rate. Since the capability of a society is an aggregation of the capabilities of the individuals, the social capability can also grow at a very high rate.

These statements are simple and without qualification. Economic growth and development are realization of the capabilities and thus could be equally natural as the growth of capability, unless arrested by deliberate or inadvertent efforts. The arrest might occur either at the level of development of capability or at the level of realization of capabilities or at both levels. The effect in all cases would, however, be lack of development of the economy relative to its potential. The papers deal separately with the different aspects of the above issues and thus together deal with questions why this country could not develop according to its potential, i.e., where arrests have occurred; and how it could develop, i.e., how the arrests could be relieved.

The papers have dealt primarily with issues of education and training of individuals in the society and the manner in which individuals participate in the economic activities and in the developmental process.

Men are the primary actors in what is normally known as the economic activity and in its growth in every society and, therefore, the capacities and capabilities of the individuals determine, in principal

measures, the output of products and growth. Thus, in modern societies there is a general concern for education and training of individuals in meaningful manners for higher output and productivity on the other. These matters have become sort of slogan for all countries.

India also laid a great emphasis on this aspect from the beginning of its developmental process together with its emphasis on investment in capital augmentation process. The result of all these efforts of India have, however, been most unsatisfactory.

The papers together highlight that failure in the area of education and training of individuals and indifference in the matter of utilisation of manpower in India have been primarily responsible for the low level of economic productivity. The papers also bring out how socio-economic development could be made proportional to the extent of development of human capabilities and the ways for linking these together for establishing the proportionality.

Increase of human capability in economic context is necessarily expressed in the increase of productivity, i.e., output per man. Thus all forms of education and training that do not lead to increase of output per man are irrelevant, and similarly, all forms of utilisation of manpower, with individuals endowed with relevant education and training that do not lead to increase of output per man, are inappropriate. Thus aspects of development and utilisation of man in the societies are crucial in the context of programmes for economic development.

It is one of the basic contentions of the set of papers is that the above aspects of men in the society is not only necessary for economic developmental process but also sufficient. This follows from the fact that the other economic dimensions associated with the growth process, like savings, investment and income are so mutually inter-dependent that expost savings and investment are always equal. Thus all forms of investment necessary for supporting a high level or productivity of workers are sustainable by appropriate savings. This makes economic development dependent only on qualities of individuals in the societies and their utilisation. The converse of the above that a society which is indifferent to these aspects of population is incapable of developing, however, enterprising it might be in other economic areas, is also true.

A discussion on the original proposition and its converse constitutes the substantive matter of the papers included in the collection. The papers included in part two of the book deal with the aspects of education and training which are related to the developmental process. In particular, attempt has been made to bring out in these papers the types of qualities which should be induced in individuals for making them economically more productive. These papers also cover discussions on the educational arrangements and on the system of education which could be expected to take care of the social needs of knowledge/skill formation and transmission.

In a way a concept of education has been developed in these papers which has consistency with the economic needs of the society. In order to make them materials complete in these regards two papers have been especially written for this collection. These deal with the present educational concepts in the country. The Indian educational concept was formed in the British colonial days and the modern educational development of India has rigidly adhered to this concept. It has roots which go much behind the middle ages and the system which was formed around the concept was intended to serve an objective which was different from the objective of using the products of the system for economic developmental purposes.

An essential feature of this system, with its Greek roots, is that the programme of education is built on the belief that everything that can be learnt through language is all that is worth learning. The knowledge under this programme of education is also intended to develop and strengthen this belief. In a matter of saying, the education is value inducing rather than capability and skill forming. Thus the education is lecture oriented, rhetorical and the places of education are situated away from societies in selected places where the sound of active social and economic life could not create disturbance. One difficulty of this system has been that education got isolated from the world of life and work; but most importantly, the educational system has become a mechanism for separating a group of persons from the population, by putting university stamp, for managing the socially. This has been tragic for India not only because these persons acquire no useful knowledge but also because they operate with the belief that whatever they know is the only relevant knowledge. Since they also occupy the position of authority their belief has become the social philosophy.

In a significant way, the problems faced by India are associated with the inconsistency between desired educational objective and the educational concepts which determined the system and the quality of the products. Because of this the present educational system has become not only irrelevant but also a hindrance to the developmental process since very wrong kind of quality and attitudes are induced through this educational process. Thus a detailed discussion of the educational system in a study of economic growth process in India is unavoidable.

Thus both aspects - the content of education and training and the appropriate utilization of the capacity - are equally important and determine together the pattern of resultant development of societies. Production in all situations is effectuated by men, for which definite techniques are used. Thus in the matter of increase of output per man the techniques play major role. In particular, techniques are required to be improved for increasing the output per man in the productive establishments. These relations are truaisms but there is no natural process which induce steady improvement of techniques and corresponding increase of output per man. Men by their own effort improve the techniques and then use the techniques for increasing output per man. This process establishes the predominance of man in the growth process and also determines the path which could lead to steady improvement.

The core of part three of this collection is built around discussions of the nature of education and training which is relevant for technological improvement and the appropriate uses of the knowledge which could raise the technological level of the country.

In India a great deal of attention is given to science and technology based education and use of science and technology (S/T) manpower in the developmental process. The effect of use of individuals is productive activities is dependent on the ability of the individuals and the functions in which the individuals are employed. In particular, most benefits should be available where the individuals possess great ability and they are employed in such functions in which the specific abilities are fully exploited. In the modern economies two functions are easily distinguishable, which are the functions associated with production of goods and that associated with development of techniques for production of goods. Different types of skills and knowledge are required for

conduct of these two functions. All productive activities are carried out with given productive techniques at any point of time. Thus the individuals associated with productive activities should require to know how to operate the technique in the best possible manner. This knowledge and skill are obtainable primarily through experience. In the case of the activity of productivity improvement, altogether different type of knowledge and skill is needed, part of which can be provided in formal academic institutions and part acquired through experience. This also follows that the activity of productivity improvement offers the most prolific openings for the academically educated technical manpower. In India work related to technological development is not carried out, and instead liberal import of technology has been allowed for raising the productivity levels in the establishments. The structure of the current programme, the uses of the manpower thus produced, the desired structure and the appropriate uses are the contents of these papers.

The aspects highlighted in the papers dealing with science, technology and utilization of S/T manpower in our society are that neither the structure of education with its emphasis on theoretical aspects nor the utilization, with the policy of technology import, are meaningful for development of productive abilities of the society. Most importantly, the arrangements made in India have reduced the role of individuals to insignificance with the result that the society failed to benefit, in any manner, from the qualities possessed by the individuals of this country. Another consequence of this has been that the society also failed to develop a reasonable demand for manpower qualities, leading to unemployment of processional and technical manpower. The papers also cover discussions on the appropriate options in these areas.

A few papers written on social parameters, like the traditional values and the socio-economic relations which are capable of being used for developmental purposes and thus as strength rather than weakness have also been added in this collection in part three. In the discussions on growth and developmental process the aspects of socio-economic parameters are mostly brought in whereas the developmental path adopted in India requires a different socio-cultural values and relations, and thus a significant change in the traditional values and relations. The result has been that a large part of the forces released for development in the country has been used up in fighting the resistance of the traditional system and overcoming them. There is no doubt that the Indian

traditional system is enormously strong, as otherwise it could not survive the disintegrating forces released by continuous migrations of people in India from outside, with their different culture and values. Thus, most part of the developmental forces released in India in recent years have gone for combating the resistance of the traditional system, as the traditional values and relations were generally inconsistent with the structure of the developmental forces, leaving very little for actual development.

These papers acquire significance in the context of the area of our discussion in the following way. The traditional Indian society and the social values and relations have been built around asset (human or physical) owning families which produce goods and/or services, and various conventions regarding exchange and distribution, and asset creation and augmentation. Thus the Indian Social Organisation, with its values and relations, could be wholly consistent with high level of production so long as activities were conducted within the traditional socio-economic framework. As efforts for development within such a framework were not liable to come into conflict with the traditional values and relations all developmental efforts could also be expected to yield return depending on the productive capabilities possessed by the individuals of the society. As the productive capabilities are capable of continuous improvements through appropriate education and tanning, the extent of development within the Indian Socio-economic framework turns out fully dependent on the extent of facilities for appropriate education and training of the people currently employed in traditional activities. This again brings out the crucial role of appropriate education and training in the developmental process.

The programme was otherwise indifferent to the skills and capabilities needed for working in the establishments which were coming up under the industrial revolution. Thus this programme of education, though it did not improve the productive qualities of manpower, supported the industrial progress in England. It also supported the structure of colonial empire which followed the industrial resolution by developing appropriate values.

The Indian situation has been different. The economic activities in India were conducted in environment of self-employment. The values and social relations in India were consistent with activities conducted in

an environment of self-employment and this could also be consistent with high level productivity if the activities were conducted within the traditional framework. Thus the liberal education which aims merely at developing values appropriate for wage-based economic environment and indifferent to skill and information could be irrelevant in India.

Thus a study together of the aspects of Indian values and social relations, role and characteristics of technological development in relation to socio-economic development, and Indian education and training system, is expected to bring out a direction which could be taken for inducing rapid development in the country. In particular, it should appear evident from the discussions in all the papers that India could do very well in the developmental front if it had adopted a straight forward approach of improving the productive ability of the variety of artisans, craftsman and of workers in general, who bring in active business would have readily employed their advanced ability for raising their production and productivity and level of living. There could also be no doubt that the traditional values and social relations would not only have been consistent with such a situation but also could have accelerated the process of development, since the relation together had an equilibrating force. It has been a contention of one of this papers that all the economic and technical advantages of a large scale production could be obtained from an ordered collection of small scale activities.

Education and training are the methods for improving manpower qualities. India's concern for this aspect has been enormous and a massive public system has been built up for this purpose. India has adopted fully in this regard the liberal educational programme developed in England. England was a self-based society and the existing social values and relations before the industrial revolution fully supported the rigid bondage between the property owners and the workers. The social relations and values were inconsistent with the economic organisations which were developing under the industrial revolution. The liberal educational system developed primarily as a means for inducing new social relations and values which could be consistent with the emerging economic structure.

A paper on population growth and savings has been added in this collection. This has brought out that for inducing growth within Indian Socio-economic framework the development of manpower qualities

could be sufficient as the household based economic organisations could be expected to generate enough savings for meeting capital needs under certain circumstances.

A great halo has been associated with technological development in the country by linking this with science and separating it from the simple act of improvement of productive technique. Thus, it is believed that no technology is worth the name unless developed in the west and that nothing might be gained by employing Indians for developing technology in India. In the process, no effort has ever been made for improving the productivity of workers in traditional activities which could be utterly simple, and extensively adoptable, being simple. For example, potters could raise their productivity enormously if they could be relieved from turning their own wheels in the same way as weavers could do with power looms. The blacksmiths could be made more productive with improvement of their furnance, tools and materials. These developments are also technological developments and could be brought about within the Indian industrial framework itself. A developmental process initiated at the rural end, with a straight forward approach of raising the productivity of workers, could definitely lead to various sorts of improvements in the productive techniques. As these improvements could lead to steady improvement of output per man, for a large number of persons, technological development of this nature might have much greater economic significance for this society than the significance of imported technology which effects merely one establishment and which in most cases provided no profit for the society.

The last paper included in this collection serves effectively as a conclusion. The original papers was presented in a conference with a title— India 2001 and National Manpower Information System. This paper has been slightly modified so as to serve as the conclusion of this volume. It summarizes the essential message of this volume which is that there is no escape from using and depending on Indian for India's development, for which appropriate programme of development and utilization of individuals of this society is both necessary and sufficient.

As a whole, the volume has been formed as a starting point for real resource based planning in the country. Economic growth in any society amounts to producing more and more commodities per unit of time. The basic ingredients of any commodity are materials, machinery, labour

time and labour capability. The materials and machinery are also commodities and the ingredients for these are also the same. Thus going all the way backward, the basic ingredients for commodities in the societies are the natural resources, labour time and labour capability. The supply of natural resources is given for any society, and the supply of labour time is demographically determined, and thus the labour capability is the only ingredient which can be controlled for manipulating growth in the societies. There is also no doubt that the developed countries are so merely because the men of those societies have great capability. In economic sphere this is reflected in their capability for developing better and better techniques and using them for producing commodities. The identification of the real resource for economic development, that is the capability of men, and the elaboration of the method for improving and utilizing the resource for economic development are the basic objectives of this work.

All the papers were prepared for presenting in academic seminars. Thus though the subjects dealt were of popular interest, the presentation could not be made wholly popular. It is. however, felt that the matters should be easily apprehended by all.

The subject of real resource based planning is being vigorously discussed in the Institute recently, with Prof. Gautam Mathur, the Director taking great interest in the subject. My ideas on the subject has been formed to a great extent through discussions with him. I am deeply indebted to him generally and for many ideas particularly. I also take this opportunity to acknowledge the help received from Shri Shashi Kumar and Shri S.K. Sengupta of IAMR in Statistical matters. I will fail in my duty if I do not take this opportunity to express my gratitude to Dr. B.N. Banerjee, of B. R. Publishers Ltd., for undertaking the publication of this work.

AJIT KUMAR DASGUPTA

CONTENTS

PART ONE

Misuse of Population in Relation to Economy

CHAPTER I

INDIAN POPULATION AND THE ECONOMY

Population

The population of India was counted as 685 million in 1981. In 1971 the population was 548 million. There, thus occurred an increase of 25 per cent in the population during the last 10 years. The estimated annual growth rate was 2.25 per cent.

Upto 1951, growth of population during a decade remained around 12 to 13 per cent; growth during 1921 to 1931 was 11 per cent, during 1931 to 1941, 14 per cent, and during 1941 to 1951, 13 per cent. Thereafter, the growth during decades accelerated steadily. However, the growth during, 1961 to 1971, and during 1971 to 1981, were nearly the same, though the latter was slightly higher.

The population in the age-group of 0-14 years was less than 40 per cent upto 1951. The figure was 40 per cent in the Census year of 1931; and less than 40 per cent in all other Census years. In 1951, the figure was the least (37.5 per cent) in this century.

After 1951, the per cent of the population in this age-group steadily increased upto 1971 and reached a figure of 42.1 per cent in 1971. This increase, in a way, has consistency with the increase in the growth rate of population during the period of 1951 to 1971.

The proportion of population in the age-group, 60 year or above, was 4.1 per cent in 1931. The population in this age-group was more than 5 per cent in the previous Census years in this century. The population in this age-group increased again after 1931. But there was a decrease in the figure in the 1961 Census count. In 1971 this population was 5.2 per cent, and in 1981 6.5 per cent. This increase in the population of this age-group has consistency with the rising expectancy of life in the country regarding which data are presented subsequently.

The population in the age-group of 15-59 years was 56.7 per cent in 1951. After 1951, the population in this age-group, percentage-wise, decreased steadily. In the year of 1971, it reached a figure of 52.7 per cent. In the year of 1981 the figure increased to 53.9 per cent.

The sex distribution of the Indian population has varied regularly during this century. In the year of 1901, there were 972 females per thousand males. Upto the year of 1971, the number of females per thousand males steadily declined and reached a figure of 930. A small increase in the sex ratio has been recorded in the 1981 Census (933 per thousand male).

The crude birth rate had reached a figure 49.2 per thousand population during the period, 1911-1920. This was a culmination of a steady growth process in this rate evidenced from 1891. The crude birth rate started declining after 1920, and reached a figure 39.9 per thousand during the period, 1941-1950. In the two subsequent decades, it again increased, but very slowly, and reached a figure of 41.2 per thousand in the decade, 1961-1970.

Crude death rate in India was more than 40 per thousand before 1920. During the period, 1911-1920, the highest rate of 48.6 was recorded. After 1920 steady decline in death rate has been recorded except for the last decade of 1961 to 1970, when it registered a slight increase over the last decadal rate. During 1951-1960, the crude birth rate was 18 per thousand during 1961-1970 the rate recorded was 19.2 per thousand.

The birth and death rate figures for the period 1971-1980, are not available yet. Some indications in this respect are available, however, from the age distribution of the population. In 1971 the per cent of population in the age-group of 0-4 was 14-51; the population in this age-group has been recorded as 12.9 per cent in 1981 count. This would mean, assuming that mortality rate in this age-group did not change significantly, that the number of birth in proportion to the population during the last 4 years have been less than the number of birth in proportion to the population during the four years preceding the 1971 Census.

Estimates of the ratio of the population in the age-group 0-4 to the female population in the age-group, 15-49, are also available for the Census years of 1961, 1971 and 1981. The ratios in terms of thousand women in the age-group, *15 to 49*, are estimated as *659*, *655* and *546* for the respective Census years of 1961, 1971 and 1981.

There is, therefore, definite indication of a decline in the crude birth *rate during 1971 to 1980.* As the growth of population during the decade,

1971 to 1981, percentage-wise, was as much as the growth during the previous decade, it also follows that there was a decrease in the crude death rate also during this period.

The expectancy of life at birth during the decade, 1891 to 1900, was 23.63 years for males and 23.96 years for females. The life expectancy at birth decreased thereafter steadily. The expectancy thereafter increased. During 1961-1970 the figures were 46.4 for males and 44.7 for females.

The expectancy of life at age of 60 also increased considerably. During 1891- 1900, the expectancy estimated for males was 9.53 years, and that for females was 10 years. The figures estimated for the period, 1931-1940, were 12.59 for males, and 13.68 for females. The estimated figure for the period, 1941-1950, however, shows a drastic fall both in respect of males and females. Thereafter, the two successive estimates show progressive improvement; and the figures for 1961-70 are 13.6 for the males and 13.8 for the females.

Population and Economy

According to 1971 population census records the size of Indian working force was about 180.5 million. This increased to 222.5 million in 1981. The size of male workers in 1971 was 149 million which increased to 177.5 million in 1981.

The female workforce, according to the census record, was 31 million in 1971. In 1981 census this component increased to 45 million. Data on the workforce are also available from the NSS records. The NSS and the Census data on male workforce are comparable. There is, however, a difference in the female workforce data in the two sources. The NSS provides a relatively larger count of female workforce than the census. The two investigations use different definitions. Significantly, the counts for the males are not affected by the difference in the definition as much as the counts for the females are.

In particular, thus, the behaviour of size of the workforce in India has to be read from the behaviour of the male workforce alone. More than 80 per cent of the female workforce are also shown under agricultural activities so that the workforce data available for non-agricultural sector can also reflect the behaviour of employment in the non-agricultural sector.

The employment data are available from the Census in nine broad classes: cultivators, agricultural labourers, livestock, fishing etc; mining *and quarrying; manufacturing, processing, servicing and repairs,*

separately for household and non-household sector; construction, trade and commerce; transport; storage and communication; other services.

In 1970 about 70 per cent of the total male working force was engaged in agricultural sector. With males and females together, the percentage was slightly higher. In 1981 the proportion of employment in agricultural activities was about 66 per cent. With male and female together also the percentage for 1981 was less than the percentage for 1971.

The decrease in the proportion of employment in agricultural activities brought out by the Census data might be genuine. It is, however, difficult to hold the figures earnestly. The census counts as workers only those who take part in economic activities for most part of the year as major activity. The marginal and part-time workers are excluded from this count. In particular, thus a low proportion of females in agricultural households is included in the count of workers, though most of them engage in some form of economic activities depending on the needs of the family farm.

Among the males, decrease has occurred percentage-wise both in the cultivators and agricultural labourers group, while among the females cultivators group has increased percentage-wise, and the group of agricultural labourers has decreased. As a whole, however, the ratio of female workers to male workers increased both among cultivators and agricultural labourers along with the overall decrease in the proportion of agricultural workers during the decade of 1971 to 1981.

In 1971 employment in the manufacturing sector was a little more than 17 million, which increased to 25 million in 1981. In 1971 the employment in this sector formed 9.46 per cent of the total employment, the employment increased to 11.30 per cent in 1981. The share of employment in the household manufacturing sector was 3.52 per cent; the share decreased slightly in 1981 (3.47 per cent). That is to say that the proportion of employment in non- household based sector increased in the total employment in manufacturing sector.

Proportion of employment in all other sectors increased during 1971-81. The increase was, however, very nominal.

The population census also provides educational composition of the working force. According to the census data, 62.8 per cent of the workers in 1971 was illiterate, 9.9 per cent was literate without formal educational qualification and 20.5 per cent was below matriculation level of education. Matriculation or above constituted the remaining 6.8 per cent of the working force. The graduates and post-graduates formed 1.3 per

The level of education of the female workers was lower than the level of the male workers. 88.6 per cent of the female workers were illiterate; only 2.8 per cent were matriculation (or above).

Information regarding the educational composition of the workforce for 1981 has not yet been published. Some indication about the changes in the educational composition of the workforce is available from the NSS data. The 27th round survey of the NSS was conducted a year after the 1971 population census. The data from the two sources, however, do not match. Only the data in respect of the male workers agree somewhat. We would thus confine ourselves to the data regarding male workforce for studying the behaviour of the educational composition.

During the period covered by the 27th and 32nd round surveys the educational composition of male working force changed. The two surveys were separated by five years. The proportion of illiterate in the workforce, which according to 27th round based data was about 55 per cent, decreased to 50 per cent according to 32nd round based data. According to census this proportion was 57 per cent in 1971, which was a year before the 27th round survey. The proportion of matriculates in the workforce, according to the NSS data, also increased during this period. It was 5.28 per cent on the basis of 27th round data became 6.74 on the basis of 32nd round data. Graduates and post- graduates (professional, technical and general combined) formed 1.48 per cent in the 27th round based working force data; it increased to about 2.3 per cent in the 32nd round based data.

The educational composition of the urban working force was different from the educational composition of the rural working force. In particular, the average level of education of the urban working force was observed to be higher than that of the rural working force. On the basis of 27th round based data the components of illiterate, matriculate and graduates in the urban working force were 25.44 per cent, 16.05 per cent and 6.17 per cent respectively. The corresponding figures for the rural areas were 61.57 per cent, 2.78 per cent and 0.4 per cent.

The educational achievements of technical and professional working force, at the all-India level, are not available in detail. For the urban areas some details are available from the Census and NSS records. Census provides data on the number of persons in the working force with the following qualifications; non-technical diploma or certificate not equal to degree; technical diploma or certificate not equal to degree, technical degree or diploma equal to first degree or post-graduate degree; degree in engineering or technology; degree in medicine; degree in agriculture,

veterinary and dairy; degree in teaching. Male workers with the above qualifications were slightly less than 3 per cent of the total working force in the urban areas. Data on these lines are also available from the N.S.S.

Data on occupational distribution of the working force are available from the Census, NSS and the office of Director General of Employment and Training (DGET). The DGET collects this data under a regular Employment Market Information (EMI) programme from the public and private sector establishments separately in alternate years. The data from this source is available at great detail. All public sector establishments are covered ; while for the private sector only the bigger establishments employing more than 25 workers are covered wholly. The establishments employing 10 to 25 workers are also covered on a voluntary basis.

Between 1960 and 1970 significant changes in the occupational structure of the employment in the public sector are revealed in the DGET data. The share of the professional/technical occupations increased considerably during this period. The high level persons in these occupations were 9.1 per cent in 1960; and it increased to 12.0 per cent in 1970. There was also a drastic reduction in the proportion of unskilled workers; from 27.3 per cent it decreased to 19.0 per cent. The proportion of administrative, managerial and executive workers remained nearly constant.

In 1971 employment in high level professional/technical occupations in the private sector was 12.9 per cent, which was nearly equal to the share in the public sector in 1970. The proportion of employment in the administrative, managerial and executive occupations in the private sector was however, much less than in the public sector. Percentage-wise the figure was only 1.9.

The proportion of employment in the high level professional/technical occupation in the private sector increased to 14 per cent in 1977, which is the latest year for which data are available. The share of administrative, executive and managerial occupations remained nearly the same.

From the names of the occupations and from the description of functions and duties associated with different occupations, as used for classification of individuals in different occupations it is possible to develop insight about the nature of education and training needed for individual occupation. It is also possible to classify from this information the occupations by the areas of knowledge. In particular, the occupations are classifiable in the following areas parallel to the educational programmes under the formal and institutional framework. These are :

occupations connected with knowledge of engineering and technology, occupations connected with knowledge of health and medicinal subjects, occupation connected with knowledge of agriculture, and occupations connected with knowledge of, general educational subjects, included under the programmes of Arts, Science and Commerce education.

It is observed from the DGET data on public sector employment that in 1960 employment in the occupations requiring technology based knowledge was 23.58 per cent of the total employment which needed any form of education and training. In 1970, the corresponding figure decreased slightly to 22.53 per cent. In the total employment which needed any form of education and training, the proportion of employment in the occupations which needed general education was the highest—71 per cent in 1960 and 69 per cent in 1970. In this sector percentage-wise increase occurred only in the group of occupations which needed knowledge of health and medicinal subjects (4.3 per cent in 1960 and 7.76 per cent in 1970).

In the private sector (big establishments) the proportion of employment in the occupations which needed technology based knowledge was the highest (80.40 per cent in 1961 and 77.67 per cent in 1971). The employment in the occupation needing general education was 18.44 per cent in 1961 and 20.78 per cent in 1971.

The DGET also collects educational particulars of workers employed under few occupation divisions. It covers particularly the occupation divisions of professional/technical, administrative/managerial/executive and clerical and production process workers. The data are collected both from the public and private sector establishments under the EMI programme.

It is observed from this data that in 1970, in the public sector establishments only 43 per cent individuals classified as architects possessed graduation level of education in the relevant subjects, 29 per cent possessed diploma in the relevant subject, 7 per cent, certificate level education, the remaining possessed formal educational qualifications of some sort in non- relevant subjects. Among the civil engineers, 23.5 per cent possessed appropriate degree level education, 58 per cent diploma level education, 6 per cent certificate level education in appropriate subject areas. Among the mechanical engineers 31.7 per cent possessed degree level education in appropriate subjects, 40 per cent diploma level education, 5 per cent certificate level education in appropriate subjects.

In the private sector establishments, among the architects only 7 per cent passed degree level education in appropriate subjects and 14 per cent

possessed diploma level education. Among the civil engineers, 36 per cent possessed degree level education, and the remaining did not possess formal education and training in appropriate subjects. Among the civil engineers, 36 per cent possessed degree level education, another 36 per cent possessed diploma level education, and the remaining did not possess formal education and training in appropriate subjects. Among the mechanical engineers 40 per cent possessed degree level education, 39 per cent possessed diploma level education, and 4 per cent possessed only certificate level education. The private sector data refer to the year of 1971.

Unemployment

Regular insight into the aspects of employment and unemployment in India is obtained from figures provided by the National Sample Survey Organisation (NSSO) and the Director-General of Employment and Training (DGET). The NSSO conducts surveys of employment and unemployment at all-India level. These surveys are household based and data are collected from individual households which are included in the sample. The surveys are conducted separately in rural and urban areas, and estimates of employment and unemployment are prepared for these two areas separately.

The NSS surveys of employment and unemployment were conducted earlier annually. After 1962, however, the survey in the rural areas was discontinued. The rural survey was started again in 1972 under the 27th Round programme of the NSS. Eversince that date the employment and unemployment survey by the NSS is being conducted once in five years.

The NSS investigation of employment and unemployment is conducted using, what is called, the labour force measurement technique developed in the United States and subsequently universalized by the International Labour Organisation. With this technique, particulars regarding employment and unemployment behaviour are collected from individuals, and on the basis of predetermined definitions, individuals are classified in various activity status classes. Among the activity status classes the statuses of employment and unemployment are included so that with the count of individuals falling under these two status classes the sizes of labour force, employment and of unemployment are estimated.

An individual on the basis of this measurement technique is identified as employed if he reports involvement in economic activity for a specific

period of time during a week preceding the date of enquiry. An individual is considered unemployed, on the other hand, if he was not engaged in economic activity at all during the reference period and expressed his availability for economic work. The reference period of a week has been more or less the standard for labour force measurement in all countries.

The National Sample Survey Organisation did not, however, rigidly adhere to the standard of a week as a reference period. In some rounds in the previous surveys it adopted a reference period of a month, in some rounds it adopted reference period of even a day. For the rural areas, the NSS also adopted the whole agricultural season as the reference period and counted everyone who usually involved in economic activities during the normally active period as employed.

The activity status classes used for classification of the population have always been comprehensive so that every individual would have atleast one status and that the entire population could be distributed in the different status classes. In cases where a person satisfies conditions for being put in more than one status classes, under the labour force measurement technique the statuses of employed and unemployed were given priority over others. Thus, a student who also worked for a day during the week preceding the day of investigation would be counted as worker under this measurement technique rather than as a student for overall population classification.

Under this measurement technique, besides the types of problem mentioned above, other types of problems, particularly in the separation of the labour force between components of employed and unemployed, might arise. A person who worked for one day out of seven days of the reference week is counted as worker, though among all persons counted as worker under this definition there would be necessarily a component who did not work for the remaining six days of the week. In a way, such a procedure, therefore, overstates the component of employed relative to the component of unemployed. Similarly, among the persons identified as unemployed by this measurement technique there could be also a component who were unemployed during the week of enquiry but were employed in other weeks of the year.

The difficulties in these regards might not be faced so much in the urban labour force survey as in the rural labour force survey. In the urban areas employment is obtained more or less in organised sectors so that facts revealed in a point survey might turn out to be the regular picture. In the case of the rural area, on the other hand, particularly in the household-

based economic segment, the pattern of employment and unemployment is determined by the size-distribution of holding, the crop pattern, the current weather and climatic conditions, status of the individuals in the family and the structure of other non-agriculture and non-farm based activities in the rural areas. These factors determine not only the aggregate labour input to be provided by the members of the rural community but also its distribution in time and among the various classes of population.

The difficulty is faced mostly in rural areas in the classification of female population and particularly the members of the agricultural families. In the household based economic organisations the female members of the family engage both in economic activities, as also in what may be said household work, depending upon the needs and pressure of work. Females in these families, so to say, are liable to be classified in any one of the three statuses of employed, unemployed and household worker.

The status which is revealed at the time of a survey depends upon the period when a particular household is approached for data. Secondly it also depends upon the definition adopted for classification which is essentially a specification of a minimum quantity of economic work during a period of time for counting individuals as economic worker.

Thus, it has been found that the figures representing the labour force behaviour of the female population in the rural areas have varied over the rounds in a significant manner.

Information regarding the unemployment characteristics of the society is also revealed through the data on registration of job seekers provided by the DGET. The country has a large number of Employment Exchange Offices, principally in the urban areas for the purpose of registering individuals seeking employment. The DGET publishes the data on the number of persons on the Live Register of job seekers as on specific dates in the year. The time series of such data by states and categories of persons are expected to reveal the size of unemployed persons and its change from year to year.

The registration with the Employment Exchange Offices for seeking job is open to all individuals, whether currently employed or unemployed. As DGET provides opportunities for registration also to those who seek better job opportunities, and does not distinguish between fresh job seekers and the others the figure of the size of job seekers brought out by the DGET includes individuals who are currently employed but only seeking better employment opportunities. In a way,

therefore, the data on registered job seekers overstates the actual size of unemployment in the country.

The Employment Exchange Offices are mostly situated in the urban areas so that, by and large, the rural population does not have adequate opportunities for registering with the Employment Exchanges as job seekers. Even in the urban areas all unemployed persons could not be expected to register with the Employment Exchanges because, in any case, the job opportunities made available through the Employment Exchanges are not adequate. From this side, one also notices possibilities of understatement of the actual size of unemployment in the DGET data on number of job seekers registered with the Employment Exchange Offices. Sufficient data are also not available for developing appropriate correction factors for adjusting the data provided by the DGET so as to bring out the exact size of unemployment in the country.

Some indication about the size of unemployment is also available from the Population Census records. The population census does not provide for an activity class of unemployed in its data format. The Census authorities instead sort out first the employed component in the population and thereafter distribute the residual in a number of other activity status classes. These classes are student, house worker, too young and too old, beggars, vagrants and inmates of social and panel institutions, rentiers, pensioners etc., and other dependent population. The individuals who do not fall in any one of these classes are then put as *others* in the census classification. This class is interpreted to cover the unemployed component of the population.

The population census in 1971 and 1981 used a very rigorous definition for identifying the component of workers in the total population. For the male population, in spite of the rigorous definition, the percentage of workers in the population estimated on the basis of the census data and that estimated on the basis of data provided by the NSS in its 27th and 32nd round surveys are comparable. The definitions used by the NSS in its 27th round and 32nd round were different from each other. The definition adopted for the 32nd round survey was more or less closer to the definition adopted by the population census for identifying workers.

Rigorous definition adopted by the census, however, had led to an estimate of workforce participation for the females which is much less than that obtainable on the basis of NSS data. A part of difference has been accommodated in the difference in the estimated percentage of household workers in the female population obtainable from the two data

sources. Some effects of this definitional difference between these two sources have also been passed on to other activity classes.

The NSS initiated regular labour force surveys from its 9th round programme. The ninth round survey was conducted during May 1955 to November 1956. The reference period for the survey was one year, i.e., the individuals were asked about their labour force status during the last one year. Estimates of unemployment rate were developed for the rural and urban areas separately, and within each area, separately for the males and females. The status of unemployment was determined on the basis of statements by the respondents that they were available for jobs during the periods of their inactivity. It was estimated that in the rural areas 0.51 per cent of the male population was unemployed; for the female population the estimated unemployment rate was 0.06 per cent. For the urban areas also the unemployment rate for the female was found very low — 0.36 per cent; for the males, on the other hand, the rate was 3.13 per cent.

The NSS did not conduct rural labour force surveys in the 13th round, and in all rounds from 18th to 22nd. The urban labour force surveys were, however, conducted regularly upto the 22nd round. The 11th and 12th round surveys were combined and covered a period of 13 months — August 1956 to August 1957.

The reference period was changed from one year under the 9th round programme to one day, and this reference period was preserved upto the 13th round survey. For the rural areas, both in 10th round and in the combined 11th and 12th round surveys, higher unemployment rates relative to the rate estimated for the 9th round, were observed. The combined 11th and 12th round survey based rate was also higher than the rate estimated on the basis of data gathered under the 10th round survey. The tenth round survey covered a period of December to May, while the combined 11th and 12th round covered August to the following August.

For the urban males the variation of the reference period as also the period of survey did not have much impact. For all these rounds, the rate of unemployment remained between 3 to 4 per cent. For the urban females also, except for the 13th round, the estimated rate remained less than one per cent.

From the 14th to the 22nd round, the NSS used a one-week reference period in which any one who worked for atleast one day during a week preceding the day of enquiry was counted as employed, otherwise unemployed provided he was available for work. The urban survey was conducted in all rounds, whereas the rural survey was discontinued after the 17th round.

For the urban areas both male and female rates recorded a fall with the change of the reference period. For the 18th to 22nd rounds, the rate for the male was even less than one per cent. For the rural areas the rates for the male remained between one to two per cent.

The labour force survey was discontinued in the rural areas after the 17th round after it came to be realized that the concepts of employment and unemployment used in the western countries and in the Indian labour force surveys also, did not apply to principally agricultural societies, and that, therefore, the figures brought out through these survey did not reflect the true magnitudes of employment and unemployment in the country.

The Government of India also appointed a high level committee, headed by Prof. M.L. Dantwala for looking into the issues and for suggesting how aspects of employment and unemployment should be measured in India thereafter. The Committee evaluated the situation, and made many recommendations which formed the basis for the resumed surveys of employment and unemployment in the country. Among many changes, the National Sample Survey of employment and unemployment began to be conducted once in five years in place of the previous programme of annual surveys The first survey under the new programme was conducted in 1972-73 under the 27th round.

Under the new programme three estimates of unemployment rate were obtained. One was based on the usual status of the individuals, the second was based on the previous one-week reference period, the third was based on mandays of work done during a week relative to the number of mandays available for work. The estimated rates on usual status basis and on one-week reference period basis were similar to the rates estimated on these basis in previous NSS rounds. In respect of both the rural and urban areas the situation was similar.

The estimated rates with mandays of employment as basis were relatively higher. The difference reflected more than anything else the extent of underemployment. Survey under the new framework was also conducted during 1977-78 under the 32nd round programme. The definition of employment used in this round was changed, but estimates were also prepared parallel to the 27th round definition. The figures reflecting unemployment on this basis were also of the same order as the figures obtained from the 27th round.

On the basis of the figures provided by the National Sample Survey, one can find that, by and large, the unemployment rate for rural males has remained around two per cent (of the rural male population) during the last thirty years or so. For the urban males, the rate again has remained

steady, but slightly higher than the rate for the rural males (around three per cent). On usual status basis the estimated rural male rate turned out less than one per cent whenever data were gathered for making such estimates.

As has been indicated earlier, no effort is made to obtain directly the estimates of unemployment by the Population Census. Instead, it tries to ascertain the regular activity status of the individuals and to develop therefrom the size of the population in various activity status groups. For the non-working component of the population also the census provides a number of activity status classes. The residual population, put as *other* in the census, covers, therefore, the component of unemployment. In 1971, taking the male population, this component formed 1.13 per cent of the population. Percentage-wise, this figure is dimensionally similar to the figure provided by the NSS.

For primarily agricultural and underdeveloped countries the concept of unemployment is ambiguous and does not bring out meaningfully the additional supplies of labour available for conduct of economic functions. In a way, as the record shows, the male population in the rural areas is usually employed, that the proportion of male population usually unemployed is also not very significant. The difference between the figures provided by the census and the NSS, to a large extent, was caused by difference in the concepts, definitions and methodology of enquiry. The figures provided by both the sources, notwithstanding the above difference, are dimensionally similar so that the above conclusion is reasonably correct.

The difficulty with the concept of unemployment is evidenced most significantly when attempt to measure the rate of female unemployment is made. In the labour force based measurement technique, the size of unemployment is the complement of size of employment in the aggregate labour force. Thus, at the first instance both measurements are liable to be vitiated when labour force based measurement technique is used in primarily agricultural societies. This is evident from the wide variations in the figures for the rate of employment and unemployment provided by the different rounds of NSS and the Census. The difficulty with the concept is most significantly evidenced when account is taken also of variations in the proportion of household workers in the female population. More particularly, a definite pattern is seen only in the variation of these three percentage rates and not in any one.

There are also other aspects of the data on employment and unemployment. The aggregate income and output of the country are

necessarily subject to seasonal and cyclical forces. In a subsequent section data in these regards have been provided. Interestingly, the data on employment and unemployment, particularly regarding the males which have not been affected very much by changes in definitions, do not reflect effects of seasonal or cyclical forces in any significant manner. It only means that the seasonal and cyclical forces have only affected the productivity indices of the population. It also means that the dimensions of productivity in the data structure is more important than the dimension of employment and unemployment.

In some way, this aspect was sought to be covered by collecting data on underemployment, believing that the seasonal and cyclical features would reflect themselves in these societies in the extent of underemployment. The Dantwala Committee also made various suggestions in these matters. The NSS always tried to obtain some measure of underemployment in the society in the different rounds of its survey. In the 27th round survey, following the Dantwala Committee's recommendations, estimates of number of mandays of work performed by the members of the labour force during a week were also prepared.

The underemployment in these societies is also structural. In the enterprise owning households (agricultural or others) the aggregate household work, including the work for the enterprises, is shared by the different members of the household in definite ways depending not only upon the quantum of work but also upon the status of the household and of the members within the household. The extent of employment in activities which would be counted as economic for different members of the household is determined by the household's conventional work-sharing arrangement. Thus the periods of non- engagement in economic activities for the different members of the household are not necessarily synchronous with periods when they should be available for additional economic activities.

Underemployment for the casual wage-earning labour is reflected not in day-to-day working, but in the proportion of days in a year when they were unemployed. The casual wage earning labourers in the rural areas work both for agricultural and non-agricultural sectors. Thus with various rural works programmes in execution, by and large, the extent of underemployment for this category of workers has not been very significant.[1] A class of attached agricultural labourers is also found in the rural areas. They are more or less regularly employed

1. Data in these regards are provided in the Rural Labour Enquiry Reports. The last report for the year showed an average employment of 300 days in a year.

persons so that there is nothing like a state of underemployment in the strict sense for them.

The primary source of data on educated unemployment is the National Sample Survey. It provides estimates of unemployment rates for different educated manpower categories. In some rounds the figures are available for specific categories like matric and intermediate; for some other rates are available for inclusive categories like matric and above, graduate and above. Separate figures for the sexes and for rural and urban residence are also provided.

The concepts and definitions used for classification of educated manpower into unemployed and employed groups have been the same as those used for classification of general population. On the other hand, the problems mentioned in this regard earlier do not apply with equal force when the educated persons are concerned. Most male educated persons of the working age are either employed or available for employment, in which case they are unemployed, or student. Absorption in self-employment is very marginal. Thus, the estimates of unemployment rates for the educated persons, particularly for the males, are reasonably unambiguous.

The 10th round survey, conducted during 1955-56, reveal that 11.27 per cent matriculates and 5.92 per cent graduates (or above) were unemployed in the urban areas. Among the male matriculates 10.56 per cent were unemployed, among the graduates (or above) 5.17 per cent were unemployed. Unemployment rates for the females were significantly large. Among the matriculates 20.13 per cent were unemployed, 12.03 per cent graduates (or above) were also unemployed.

Unemployment among the educated persons in the rural areas was higher than that in the urban areas. 17.24 per cent of the population of matric and above were unemployed; among only matriculates 19.38 per cent were unemployed. As the population of graduates in the rural areas could not be very large, the unemployment rate for this group was necessarily very small. Among the males, 17.65 per cent of the population of matric and above and 19.95 per cent of matriculates were unemployed. There was no unemployment among the graduates (or above). Figures for rural females are not available.

Unemployment among the matriculates in the urban areas steadily declined upto 1966-67. The 21st round survey covered this year. The rate estimated for that year was 3.07 per cent. The rate for the graduate also decline over the years. The estimate for the 21st round was 2.18 per cent. The pattern was similar for the males. In the rural areas also similar behaviour has been observed.[2]

2. Data quoted from, "Employment and Unemployment in India" by P. Visaria, appended in the Report of the Committee of Experts on Unemployment Estimates (Dantawala Committee).

After 1966-67 there occurred a change in the behaviour of unemployment among educated persons. The survey of employment and unemployment was discontinued by the NSSO after the 21st round. It was resumed only in the 27th round which covered the period of 1972-73. The data from the 27th and 32nd round are only available for study of the trend after 1966-67.

Data from 27th and 32nd round survey, compared with the data from the 21st round survey, definitely reveal steady increases in the unemployment rates for the educated persons. The unemployment rate for the male matriculates in the urban areas was 5.89 per cent in 1972-73. It increased slightly further to 7.29 per cent in 1977-78 (32nd round). The rate for the female matriculates was 6.13 per cent 1972-73, it increased to 9.43 per cent in 1977-78.

The increase in the unemployment rate for the graduates was very sharp From 2.18 per cent in 1966-67 for the males it increased to 6.77 per cent in 1972-73, and to 8.19 per cent in 1977-78. The unemployment rate for the graduates of general subjects was higher than the rate for the graduates of professional and technical subjects; these were 7.21 per cent and 5.05 per cent for the respective subject areas.

The unemployment among educated persons in the rural areas continued to be more intense than the unemployment in the urban areas. For the matriculates the difference in rates was not very large, both in 1972-73 and 1977-78. For the males graduates, on the other hand, unemployment in the rural areas was 17.33 per cent in 1972-73 and 17.56 per cent in 1977-78; for the females the rates were 19.07 per cent and 21.89 per cent in the two years.

The unemployment rates for the male matriculates were less in the decade of seventies than the rates in the decade of fifties. For the graduates, on the other hand, the rates were higher in the decade of seventies than the rates in the fifties. Most significant fact in this regard is that the rates for the graduates were less than the rates for the matriculates in the fifties and early sixties, and that the rates were higher than the rates for the matriculates in the seventies.

Indications about the state of unemployment among the educated persons are also available from the data on size of job seekers in the live register of the employment exchanges. The absolute figures from these records are not significant, but it is possible sometimes to read the trends from this data.

In 1967 the number of matriculates registered with the employment exchanges was 714 thousand, in 1981 the number registered was 5008

thousand, being about 7 times as much as the number in 1967. The size of registration of educated persons of higher secondary/intermediate level in 1981 was also a little more than 9 times as much as the size of registration of these persons in 1967.

About 47 thousand graduates in arts subjects were registered in 1967. The corresponding figure for 1981 was 752 thousand, being more than 15 times the figure for 1967. The registration figure for 1981 in respect of science graduate was also about 15 times as much as the figure for 1967.

These figures, in a way, confirm the conclusions regarding the relative unemployment behaviour as between the matriculates and graduates revealed in the NSS data.

The employment exchanges also register general post-graduates and technical and professional graduates and post-graduates. Individuals usually register with the employment exchanges as job seekers because they expect that they will be considered for appointment to those positions for filling which the employers seek the assistance of the employment exchanges.

According to the act and other Government instructions, for relatively lower jobs, employers are required to consider only the candidates referred by the employment exchanges and make selection out of them. For the higher level positions, in both public and private sector establishments, there is no such requirement. Thus, highly educated persons, including graduates of technical and professional subjects, usually do not register with the employment exchanges as the job handled by the exchanges are not usually attractive for them.

Therefore, it would be expected that, all unemployed matriculates, B.A.'s, B.Sc.'s, and B.Com's would register with the employment exchanges for jobs wherever facilities are available. To this extent, the figures in respect of those persons have a significance. Similar significance may not be attached to the figures in respect of higher educated persons.

On the basis of 32nd round NSS data the Planning Commission also prepared estimates of unemployment rates for different categories of educated persons. According to these estimates less than three per cent arts postgraduates, a little more than three per cent science postgraduates, about five per cent commerce postgraduates, about 16 per cent arts graduates, and about 15 per cent science graduates were unemployed.[3]

3. Sixth Five Year Plan (1980-85), Government of India, Planning Commission.

Economic Achievements

The indicator usually used for measuring the achievement of an economic society is the gross national product and gross national product per head of the population. According to data provided by the Central Statistical Organisation, the gross national product of Indian Union in 1970-71 was valued at 36,452 crores of rupees. The GNP increased to rupees 50,767 crores at constant 1970-71 prices in the year of 1980-81. The per capita net national product in 1970-71 was estimated as 632.8 rupees; it increased to Rs. 700.4 at 1970-71 prices in the year of 1980-81.

The average rate of growth of net national product during the period, 1970-71 to 1980-81, was 3.43 per cent. The growth of net national product has not been steady in the society. There was period, for example, during 1978-79 to 1979-80 when absolute value of net national product decreased sharply (—5.31%). There has also been a period when it increased very sharply, for example, during the years 1976-77 to 1977-78 and 1974-75 to 1975-76 the growth of national product was more than nine per cent

The average rate of growth of per capita income during the period 1970-71 to 1980-81 was 1.12 per cent. In respect of the per capita income also the gowth rate has not been uniform over the decades. Since growth of per capita income is obtainable as differences between the growth rate of net national product and the growth rate of population, the latter remaining uniform over the decades, the growth of per capita income has followed the pattern of variation of growth of gross national product.

The real achievement of the national economy as an indication of the productivity of the society is not reflected wholly in the growth either of national product or of the per capita income. The growth is necessarily associated with the efforts made by the society towards its achievement. In particular, the economic growth realised during a period is the result of immediate satisfaction foregone by the society through its savings. Thus, in a way, the real measure of society's achievements in economic front is obtained by comparison of the rate of economic growth with the rate of savings of the society.

In 1970-71, according to the data provided by the Central Statistical Organisation, the gross savings rate of the society was 16.8 per cent. In the same year, the rate of capital formation was 17.8 per cent of the national income. In the same year, the net capital formation rate was 13 per cent of the net national product and the net domestic savings rate was 12 per cent.

The rate of gross saving increased to 21.9 per cent in 1980-81. The net savings rate was 16.7 per cent in that year. The rate of gross capital formation in 1980-81 was estimated at 23.8 per cent and the net rate at 18.7 per cent.

In a way, the data on the growth of national product and annual amount of capital formation can be used for determining the amount of capital which the society has to make available for obtaining one rupee worth of annual additional output. In particular, the marginal capital-out put ratio which is a measure of the above relationship is obtainable as a ratio of the savings rate and the annual rate of growth of national product.

It would be appreciated that in general the greater is the amount of capital needed for obtaining annually a rupee worth of additional output the smaller is the effective productivity of capital. It is also an indication of the extent of sacrifices needed for buying a rupee worth of additional income by the society, and that the more is the marginal ratio the smaller is the degree of achievement in the economic front by a society when compared with a given figure for a year.

The rate of growth of national product as has been noted was on the average 3.4 per cent during the decade of 70s. In 1970-71, therefore, assuming a steady growth of the national product, the marginal capital output ratio was slightly more than 3.8. In 1980-81, it increased to 5.5. These figures mean that in 1970-71, the society required to save and invest 3.9 rupees for obtaining an annual increase of one rupee worth of output; and in 1980-81 it required to save an amount of 5.5 rupees for obtaining a similar annual increase in output. There is, therefore, clear evidence that the achievement of the Indian Economy in relation to efforts made for obtaining a rupee worth of output steadily decreased during this decade.

The situation was, as a matter of fact, the same during the entire period after independence. The rate of growth of national product for this country has been, on the average, of the same order, i.e., 3.4 per cent per year, during the earlier period of 1950-1970 also. The rate of saving estimated at the beginning of the Second Five Year Plan was of the order of 7 per cent. The rate of capital formation at that time could have been of the order of 9 to 10 per cent, as it is known that a significant amount of investment was financed by drawing upon the sterling balances.

Using the rate of growth of 3.4 per cent on the average, the marginal *capital output ratio for the initial years of the Second Five Year Plan turn out as something like 2.8. This figure is also nearly equal to the figure* used by the planners at that particular period of time. Thus, it follows

that this increase in the marginal capital output ratio, i.e., the increase in the extent of efforts needed for a rupee worth of additional output has been a regular feature of this economy ever since the country initiated programmes for its economic development.

One reason for the increase in the capital output ratio for the society could be that a large part of investment was made all through the period in development of infrastructure facilities and of modern lines of economic activity which are highly capital intensive. In itself, however, this reason might not be sufficient for justifying increase of aggregate capital output ratio over a long period of time. The development of economy in all societies have been marked by increases for investments in areas which apparently require large amount of capital investment.

Thus the share of such activities in all societies which are considered presently highly developed has shown continuous increase over the period when these societies were developed. On the other hand, on the basis of the data on capital and output available from these societies, there are evidences of continuous decreases rather than of increases of the aggregated capital-output ratio. As a matter of fact, it has been this feature of the developing societies which gave rise subsequently to discussions regarding the residual factors in economic growth process.

The achievement of the society in economic front is also measurable through a consideration of the extent of utilisation of human resources. In a way, there is a parallelism between earlier discussion about capital utilisation for obtaining a given extent of growth of annual output and discussions about human resources needed for the same feature. In one sense, an increase in capital-output ratio is an indication of surplus capital capacity being created in the society, for expectedly, even a lesser quantity of capital could produce the given unit of output.

In the human resources area, such excess capacity can be revealed either in continuous decreases in productivity of labour or in large unemployment of individuals or in both. A fall in a labour productivity, i.e., output per manhour which amounts to increasing the number of persons for producing a given quantity of output is similar to rising capital output ratio. Detailed data, however, are not available for developing estimates bearing out changes at the aggregate level in the ratio of labour to output in this country. One can, on the other hand, obtain an insight in this area by comparing the rate of growth of national product with the rate of growth of population and the behaviour of work force participation rate.

Even such efforts in India cannot be made because the knowledge

about the workforce participation behaviour for the entire period of 1940-1980 is not available. The data sources, particularly the National Sample Survey, have changed the concepts and definitions over this period on many occasions so that it is not possible to get insight into the behaviour of the workforce participation rate in the country.

However, given the knowledge that the per capita income increased modestly at the rate of little more than one per cent per year and assuming that there did not occur a large increase in the workforce participation rate during the entire period one can reasonably hold that aggregatively the output per man has increased slightly in the society during the last 30 years.

Evidences have been presented earlier regarding the unemployment behaviour in the society. Although for the reasons mentioned above, it is not possible to obtain exact measure of the rate of unemployment of the society for the entire period from 1950-1980, the evidence so far available which have been presented earlier indicate very generally that aggregate rate of unemployment covering both the rural and urban parts of the country have not been increasing very much. In absolute size also the level is not very alarming. On the whole, the unemployment rate remained around 2-3 per cent of the total population.

On the other hand, evidence also clearly indicate an increase in the unemployment of educated persons relating to their stock. An immediate implication of the two pieces of data i.e., constancy of aggregated unemployment rate and increasing proportion of unemployment among educated persons is that the proportion of educated persons among unemployed population is rising steadily in the society.

If the size of educated unemployment is measured in human capital terms, giving it a rupee dimension comparable to the physical capital stock, in line with the efforts made in many countries, then one would also note that as a whole the extent of capital that the society is making available through foregoing immediate consumption is rising very fast and that more and more of it is being needed for obtaining a rupee worth of output annually.

The educational composition of the workforce, data in which regard have been presented earlier, on the other hand, is not consistent with the requirements of knowledge and skill for different types of occupations. It has been observed that a significant fraction of individuals in the occupation of professional, technical and related activities does not possess even the minimum requirements for such occupations. More particularly, it has also been noted that 40 per cent in these occupations

did possess a graduation level of general education, whereas the individuals in these occupations should be expected to possess not only matriculation level of general education but also additional education in professional and technical areas. It has also been noted that among administrative/executive and managerial workers as many as 63 per cent did not also possess matriculation level of general education.

The recorded low level of education of the workforce and the record of unemployment of educated persons in the country together with additional records of rising level of unemployment among educated persons are inconsistent among each other. The high level of capital formation together with apparent emphasis on capital intensive forms of economic activity should necessarily create larger demand for educated manpower for conduct of different forms of activities under such programmes, whereas no evidence in this direction is visible.

Even more inconsistent is the fact that though a large number of technically qualified persons find difficulty in getting appropriate employment in activities which require technical education and training of reasonably high order, such activities are being performed by individuals without formal education in these areas.

CHAPTER II

SOCIO-ECONOMIC TRANSFORMATION OF INDIA : THE MANPOWER ANGLE

India has always been a populous country. It had a population of 238 million in 1901. The crude birth rate of the population was also very high, being of the order of 48 per thousand. The growth of population was, however, not very large as the crude death rate was also of a similar order. The birth rate has continued to be very high with only a minor decline over the years. In 1970 it continued to be around 40 per thousand population. On the other hand, after 1920, the death rate started declining rapidly, reaching around 19 per thousand from about 49 in 1920. Because of the rapid decline of death rate relative to the birth rate, population has grown in India at higher and higher decadal rates. During the decade 1911 to 1921 there was an absolute decline of the population, while it increased by 25 per cent during the decade 1971 to 1981. In 1981 the population was counted as 685 million. The relevant figures are presented in Table 1.

A significant feature of the Indian population has been a steady decline of the sex ratio all through during the 20th century upto 1971. In that year there were 930 females per thousand males. It appears that the trend has been arrested. In 1981, the sex ratio recorded an increase to 933.

The age distribution of the population for the years of 1961, 1971 and 1981 have been presented in Table 2. What is remarkable is that India has a record of decrease in the proportion of population in the age group of 0-4 in 1981. In 1961, the population in this age group was 15 per cent which continued at nearly the same leal in 1971. It declined to 12.6 per cent in 1981. This is indicative of a significant decrease in the birth rate during the latter part of the seventies

In Table 3, the behaviour of working force participation rates has been presented for the years of 1961, 1971 & 1981. Classification of individuals as workers and non-workers is in part subjective, being dependent on the definition adopted. The definition used in India has varied significantly as between the agencies collecting the data, and for individual agencies,

over the rounds of investigation. Thus, the data available in these regards are not comparable. We have refrained from presenting the data for 1951, as figures relating to that year is overtly incomparable with other figures. Even the figures in respect of 1961-1971 are not strictly comparable. There is, however, a feeling that the figures in respect of male population can be compared. It will be observed from the table that the working force behaviour of the population remained merely steady during 1971 to 1981. There is also an indication of a decline in the working force participation rates during 1961-71, but its extent cannot be read from the census data.

Data presented in Table 4 show the percentage distribution of the working force in India in three broad sectors of economic activity from 1901 to 1981. In this area also the changes are the best reflected in the figures in respect of males. The primary sector accounted for over 75 per cent of the total male workers in 1921. In that year, the secondary sector accounted for 10 per cent and the tertiary sector, the remaining 15 per cent of the male workers. The proportion of male workers in the primary sector decreased subsequently and was 70 per cent in 1971 and 66 per cent in 1981. In 1981, the proportion in the secondary sector was 14 per cent, representing a significant increase from 1921. The proportion in the tertiary sector in that year was 20 per cent which also represented significant increase.

Changes in Occupational Distribution

The decline of the workforce in the primary sector is also reflected in the changes of the occupational distribution of the working force. The figures relating to the occupational distribution of the working force could not be presented for any year other than the year of 1971 and 1981. The change between these two years is, however, significant and brings out generally the trend in the past. In 1971, 72 per cent of the working force was in agricultural occupation. In 1981, it accounted for 69 per cent of the working force. During these decades most gain has also been recorded in occupations relating to manufacturing and processing.

Simultaneously, with the above-mentioned changes there also occurred changes in the quality of population. In the beginning of the century 5.35 per cent of the population was known to be literate. In 1981, the literacy rate was slightly more than 36 per cent. With the improvement of facilities for higher education, the educational intensity of the population has also improved considerably.

In 1961, only 1.87 per cent of the population had matriculation or above level of education. In 1971, such persons constituted about four per cent of the population, and in 1981 nearly eight per cent. Tables 9 and 10 show the educational distribution of the population separately for rural and urban areas of the country. The improvement of the educational intensity of the population was shared both by the urban areas and the rural areas. In the rural areas less than one per cent of the population possessed education of the level of matriculation or above in 1961, while in 1981 this group constituted about four per cent of the population. In the urban areas, in 1961 matriculation or above population constituted about seven per cent and in 1981 this group constituted about 18 per cent.

Educational distribution of the working force for the years 1961, 1971 and 1981 have been presented in Tables 11, 12 and 13. In 1961, only 2.7 per cent of the workforce possessed matriculation or higher level of education. In 1971, about seven per cent of the workers had similar educational qualifications and in 1981 about 12 per cent. The improvement in the quality of the urban workforce during the same period was even more remarkable. In 1961, a little over 12 per cent of the workforce possessed matriculation or higher level education. Similar persons constituted more than 30 per cent of the workforce in 1981.

The 20th century also witnessed a significant extent of urbanisation in India. In 1901, 11 per cent of the total population was counted in the urban areas. It increased to 7 per cent in 1951 and 23 per cent in 1981. The rate of urbanisation also accelerated after 1961, when the proportion of urban population was only 18 per cent.

Female Literacy

During the 20th century the place of females in society has also changed considerably. In 1901 the literacy rates for females was only 0.7 per cent compared to 9.8 per cent for the males. Female literacy rate reached a figure of 25 per cent in 1981 when for the males the figure was only 47 per cent, which indicate a significant reduction in the gap between male and female literacy rates (Table 7).

The educational intensity of females has also improved considerably. In 1961, only 0.6 per cent of the female population possessed matriculation or higher level of education. In 1981, about four per cent of the female population possessed matriculation or higher level of education (Tables 8, 9 and 10).

Improvement of the educational intensity of the female population is also reflected in the educational composition of female workers. In 1961, only about 0.5 per cent of the female workers possessed matriculation or higher level of education. In 1981, about five per cent of the female workers had matriculation or higher level of education (Table 11, 12 and 13).

Economic Transformation

One of the most important characteristics which distinguish underdeveloped from the developed countries is the share of agricultural output in the gross domestic product of the economy. Before 1947, i.e., before the country became independent, no systematic effort was made by official or non-official agencies to estimate regularly the national income of the country. Some estimates prepared by individuals at various points of time are however, available. Estimates made by Digby and Atkinson provide some indication of the share of Agriculture in the total income for the years immediately before the close of the 19th century. Digby put this share at 67 per cent and Atkinson at 63 per cent, for the territories in British India. Findlay Shirras made an estimate for 1921 and put the share at 66 per cent. V.K.R.V. Rao produced two estimates, one for the period of 1925-29 and the other for the period of 1931-32. These were 57 per cent for the earlier period, and 53 per cent for the latter period.

Regular estimates of national income were made for years after 1947-48. According to these estimates the income from agriculture remained closely around 50 per cent of the national income up to the year 1953-54.

The share of the income contributed by agriculture in the eighties has become less than 40 per cent. The related decrease in the share of agricultural output has been made up by increases in the share of the secondary and tertiary activities. The secondary sector covers primarily manufacturing activities. Within this sector too significant changes have taken place. Production in the manufacturing sector is of two types—consumption goods and capital goods. The component of capital goods is made up of machinery, tools and equipment. Significantly, changes have occurred in the distribution of output of the manufacturing sector between these two types.

Indications of the share of capital goods in the output of the manufacturing sector are obtainable from the information regarding the annual rates of saving. Annual saving is used for supporting the domestic capital formation which has two components. One part goes for meeting the expenditure on construction and another for sustaining the output of machinery and equipment required for augmenting further production of

goods and services. Thus the rate of saving provides an indication of the percentage of the gross national product formed by output of machinery and equipment. In the past, the share machinery and equipment in the aggregated capital formation was less than 50 per cent.

The rate of saving during the first plan period was of the order of seven per cent of the national income. Therefore, during that period the output of machinery and equipment in our country was less than three per cent of the national product. In the eighties, the rate of domestic saving reached around 24 per cent. The share of machinery and equipment in the domestic capital formation also became around 50 per cent. Thus, something of the order of 12 per cent of the national income is now formed by machinery and equipment. As a fraction of the output of the manufacturing sector, the figure would be around 50 per cent which is significant by all standards.

Significant changes have also occurred in the organisation of production in the country. After independence many economic activities were undertaken under the public sector. In 1960-61 the contribution of the public sector to the gross domestic product was around 11 per cent. In 1982-83, its contribution reached 25 per cent. In many sectors its contribution was overwhelming: for example, in mining and quarrying it accounted for 78 per cent; in electricity, gas and water supply 87 per cent; in finance, real estate and other services 71 per cent and in banking and insurance 68 per cent. Such increase in the contribution of the public sector occurred because a large share of the gross domestic capital formation went to it. In particular, 45 to 50 per cent of the gross domestic capital formation occurred in the public sector from 1960-61 onwards.

The changes recorded above have been significant. By all standards of measurement the facts relating to the period before the fifties point to an essentially agrarian and underdeveloped economy. The aggregate levels of output, its distribution and the implicit ratios were such that there were no visible escape from the trap of underdevelopment. The economy was stagnant at the lowest subsistence level without prospectus of a take-off.

The situation in the eighties, on the other hand, is remarkably different. The levels of output and product composition are now such that a rapid economic growth is inherently implicit in the situation. It has reached a rate of saving which is far larger than what is required for a take-off. On the production side, a technological capability has been acquired in virtue of which a self-sustaining growth of any order is possible. Significant diversification in the educational and training programme has occurred over the years, which is also sufficient for meeting the manpower needs of a rapidly growing economy.

There are, however, some aspects which call for a deep probe.

Difference in Flexibility

The growth of the national product can be because of many factors, such as the growth of employment of labour, the growth of employment of machinery and equipment, i.e., capital, and an improvement in the capabilities of labour and machinery. Since the improvement in the capability of machinery is brought about by the capabilities of labour, the third factor can be stated simply as improvement of the capability of labour. In average or per-person terms it can be said, that the growth of output which an average labourer brings about, depends on the quantity of additional support of tools and machinery he receive and the extent of improvement of his capacity to take advantage of the additional capital. It is possible to separate the contributions made by the additional capital support and by the improvement of the efficiency of the worker in the additional output produced by a worker on the average.

Among these two factors, the growth of capital support per person is tied to the growth of production of capital goods, and correspondingly, the savings behaviour, and thus has limited flexibility. On the other hand, the other factor of growth efficiency, has extensive flexibility, and can therefore, be a major instrument for economic growth in any society.

Some information is available regarding the rôle these two factors played in different countries. Denison made a study of the post-war experience in nine western countries to identify why growth rates differed among them. The report of this study contains estimates of the annual average growth rate of product per person during, 1950-62 and of the part contributed by the growth of capital support per person. One gets thus also estimates for those countries of the part contributed by the growth of efficiency, as a difference between the two rates. The countries covered by the study are—Belgium, France, Germany, Italy, Norway, England, Netherlands, Denmark and USA. One observes from the report that the contribution by the growth of capital support per person in the growth of product per person has been less than one per cent for all these countries, when the growth of product per person varied in these countries from 1.63 per cent to 5.36 per cent. In other words, the variation in the rate of growth of product per person has depended primarily on the variation in the rate of growth of efficiency in those countries. The highest growth rate of product per person (5.36 per cent) was recorded in Italy. In that country the contribution of the efficiency factor was 4.79 per cent and that of capital support per person .57 per cent.

For India the growth of the per capita national product over the period 1950-1980 has been on the average at the rate of 1.5 per cent per year. During this period, the capital support per person increased at the rate of 4.5 per cent per year. Contribution by this factor of growth of capital per person, therefore, was of the order of 1.4/1.5 per cent points per year. This leaves an estimate of a maximum of one decimal point as the contribution of the efficiency factor in a total growth of 1.5 per cent per year.

Neglect of Human Resources

In particular, the indifference towards the benefits available from human resources has been apparent all along. This feature is best reflected in the state of unemployment among educated persons. Table 14 shows the distribution of the total unemployed population by levels of education over the period 1955 to 1978. It is observed that in 1955-56, about 76 per cent of the total unemployed persons in the urban areas was educated below the matriculation level. Illiterates were only 12 per cent, and 64 per cent was literate but had not passed the matriculation examination. In the same year unemployed individuals who were matriculates, but below the graduation level, were 20 per cent of the total unemployed population; and graduates and above constituted another three per cent or a little more. In 1972-73, unemployed individuals below the matriculation level decreased relatively constituting 63 per cent of the total unemployed population. On the other hand the proportion of matriculates and above in the unemployed population increased to 37 per cent in 1972-73 and 41 per cent in 1977-78, from 24 per cent in 1955-56.

All types of educated persons face unemployment. Even the technical and professional persons do not escape, though in their case the visible effect is reduced to a large extent by the controls exercised on the increase in enrolment.

Economic planning in India did not start with an inventory of real resources available within society which could be utilised for the production of economic goods. The Indian planning instead followed a conventional and stereotyped approach of working out the extent of the current output of goods and services which could be saved and invested for the further growth of the economy. Since the part of the current economic production which could be saved and set aside for use of future production was the component of capital goods in the output of current goods, the entire planning effort was reduced, under the circumstances,

merely to working out how much capital could be produced and set aside for augmenting the stock of physical capital.

In this approach growth of employment in society was only a derivative, dependent upon the quantities of capital formed and the technological choices exercised in further uses of the newly formed capital. In particular, as employment ceased to be a part of the parameters involved in the generation and allocation of capital resources, planning seldom contained objectives of full employment in the current period and in a continuous manner. The only aspect in which the problem of employment became crucial in this planning process was when labour supply was not adequate for utilising the additional capital being generated year to year.

The alternative of looking at the economic planning process as a methodology for making full use of all the resources available in society for purposes of producing goods and services, has not been taken up seriously. As a plan for maximum production of capital goods and its full utilisation is liable to leave an unutilised residue of both human and other physical resources, in simple arithmetical terms any plan that utilises the entire capital and labour and other resources fully is liable to produce more output than a plan which leaves unutilised labour and other resources. Thus, in fact a planning process that is indifferent to the full utilisation of available human and natural resources is essentially a planning for the least efficient alternative when better alternatives were available.

Quality of Manpower

The other aspect of the alternative planning technique, based on the real resources available, is that it can take account of the fact that human productive capacities can be improved with education and training. Thus, such an approach also provides the additional possibility of raising the future rates of growth of the economy by improving the quality of manpower as a part of the planning process. The historical evidence of the gap between the observed growth of productivity of labour and the growth explainable by increase of capital per unit of labour indicates such possibilities in clear terms.

It has been argued that the correlation between the growth of productivity and the growth of education and training of the population should not be read as naturally determined, that the observed correlation is only an indication of a possibility materialisable with appropriate

programmes of education and training. The issues pertinent to the use of education and training as an input for an accelerated growth process have also been discussed in the earlier pages. Measures to ensure that the knowledge acquired by the population can ultimately be transformed into economic goods and services are, therefore, part of the planning structure for an accelerated growth process

Although extensive educational and training facilities have been added in India in recent years, these have not been programmed to meet fully the requirements of economic growth. Leaving aside the question of adjusting the course and curricula to needs of building individual skills, there has been no change in the enrolment proportions with the radical changes in economic priorities and directions of development during the last 30 years. The relationship between the occupational distribution of the workforce, reflecting the skill needs of society, and the enrolment distribution has been shown in the tables referred to earlier. The significant feature in this respect is that while about 50 per cent of the occupations are technology-based and require skill and knowledge of various forms of technology, facilities for such education are inadequate. In relative terms, on the other hand, more persons are enrolled for general educational courses than required on the basis of the occupational distribution. A programme of manpower development for improving the prospects of economic growth requires also attention to the quality of the currently employed manpower. The current stock of employed manpower in any country is invariably many times larger than the manpower that could be added to the stock year to year. Thus, for achieving overall improvement of the quality of the workforce, a programme of education of employed manpower is far more important than a programme for the education of young people as a preparation for their employment. While in most countries which have developed, the educational sector has taken care of both young and employed persons and improved the overall quality of the labour force, India, has totally neglected this important aspect of the education system. It has also been shown that due to a variety of structural and other difficulties concerned with recruitment rules and practices, even recruitment of fresh products of the universities in positions where they could be expected to make contributions proportionate to their education and training has become difficult. Because of this, the overall quality of the labour force is deteriorating progressively.

TABLE 2.1

Population by Sex, Sex Ratio, Percentage Decadal Variation of Population and Urban Population as Percentage to Total Population, 1901-1981.

Census year	*Population*			*Sex ratio (females per 1000 males)*	*% decadal variation*	*Urban Pop. as % to Total Pop.*
	Persons	*Males*	*Females*			
1	2	*3*	4	*5*	6	7
1901	238,396,327	120,791,301	117,358,672	972	—	10.84
1911	252,093,390	128,385,368	123,708,022	964	5.75	10.29
1921	251,321,213	128,546,225	122,774,988	955	—0.31	11.18
1931	278,977,238	142,929,689	135,788,921	950	11.00	11.99
1941	318,660,580	163,685,302	154,690,267	945	14.22	13.96
1951	361,088,090	185,528,462	175,559,628	946	13.31	17.29
1961	439,234,771	226,293,201	212,941,570	941	21.51	17.87
1971*	548,159,652	284,042,276	264,110,376	930	24.80	19.91
1981*@	685,184,692	354,397,884	330,786,808	933	25.00	23.31

Note : 1. The distribution of the population of Pondicherry by sex for 1901 (246,354), 1931 (358,628) and 1941 (285,011) is not available. The figures for these years are, therefore, exclusive of these population so far as the distribution by sex is concerned.

2. In 1901, sex-wise distributions of Chandannagar M. C. (26,831) of West Bengal and Gonda M. B. (18,810) of Uttar Pradesh not available.

3. The population figures exclude population of areas under the unlawful occupation of Pakistan and China where the census could not be taken.

* As on April 1, 1971. In the 1981 Census, the reference data was March 1, 1981 in all the states and union territories except Jammu & Kashmir where it was May 6, 1981. In the 1961 census the reference data was March 1, 1961. In working out the decadal variations for 1961-71 and 1971-81 the change in the reference data has not been taken into account.

@ Includes the projected population of Assam where the 1981 census could not be conducted owing to disturbed conditions prevailing in that state then.

Source : Census of India, 1981 Series 1 — India — Key Population Statistics Based *on 5 per cent Sample Data, New Delhi, 1983.*

TABLE 2.2 *

Age Distribution of Population of India by Sex 1961, 1971 and 1981

Age Group	*1961*			*1971*			*1981*		
	Persons	*Males*	*Females*	*Persons*	*Males*	*Females*	*Persons*	*Males*	*Females*
1	2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
0-4	15.06	14.68	15.47	14.51	14.15	14.90	12.59	12.33	12.87
5-9	14.73	14.63	14.86	14.96	14.86	15.07	14.07	14.02	14.12
10-14	11.23	11.62	10.82	12.55	12.85	12.22	12.88	13.14	12.60
15-19	8.18	8.22	8.12	8.66	8.88	8.42	9.63	9.85	9.38
20-24	8.51	8.05	8.99	7.86	7.60	8.15	8.61	8.42	8.82
25-29	8.33	8.19	8.48	7.45	7.16	7.75	7.63	7.49	7.78
30-34	7.03	7.07	6.98	6.60	6.45	6.77	6.38	6.28	6.49
35-39	5.80	6.02	5.57	6.00	6.07	5.93	5.85	5.79	5.90
40-44	5.21	5.34	5.06	5.16	5.30	5.01	5.14	5.25	5.03
45-49	[illegible]	4.31	3.91	4.18	4.39	3.94	4.40	4.48	4.30
50-54	3.90	4.04	3.75	3.75	3.91	3.57	3.82	4.02	3.61
55-59	2.24	2.34	2.14	2.34	2.42	2.25	2.47	2.48	2.47
60-64	2.56	2.52	2.60	2.62	2.64	2.61	2.73	2.73	2.73
65-69	1.11	1.09	1.12	1.28	1.28	1.27	1.43	1.39	1.47
70 & above	1.96	1.84	2.09	2.06	2.02	2.12	2.33	2.28	2.39
Age not stated	0.04	0.04	0.04	0.02	0.02	0.02	0.04	0.04	0.04

* Excludes Assam.

Source : Census of India 1981, Series I — India, Part II — Special Report and Tables Based on 5 per cent Sample Data, New Delhi, 1983.

TABLE 2.3

Working Force Participation Rates of India by Sex, Rural and Urban, 1961, 1971 and 1981

Census Year	Category of Workers	Total			Rural			Urban		
		Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
1	2	3	4	5	6	7	8	9	10	11
1961	Total workers	42.98	57.11	27.96	45.06	58.22	31.42	33.48	52.40	11.9
1971	Main workers	33.06	52.61	12.06	34.01	53.62	13.36	29.32	48.80	6.65
	Marginal workers	1.08	0.41	2.09	1.29	0.16	2.48	0.26	0.06	0.50
	Total workers	34.14	52.75	14.15	35.30	53.78	15.84	29.58	48.86	7.15
1981	Main workers	33.45	51.62	13.99	34.76	52.62	16.00	29.23	48.54	7.28
	Marginal workers	3.32	1.03	5.77	4.11	1.19	7.18	0.77	0.53	1.04
	Total workers	36.77	52.65	19.76	38.87	53.81	23.18	30.00	49.07	8.32

Source: (i) Census of India 1961, Vol. I, Part II B(I) General Economic Tables, Table B-I, New Delhi, 1965.

(ii) Census of India 1981, Series I - India, Part II — Special, Report and Tables Based on 5 per cent Sample Data, New Delhi, 1983.

TABLE 2.4*

Percentage Distribution of Working Force of India by Broad Sectors of Economic Activity and Sex 1901-81

Year 1	*Sex* 2	*Total Workers* 3	*Primary Sector* 4	*Secondary Sector* 5	*Tertiary Sector* 6
1901	P	100.00	71.8	12.5	15.7
	M	100.00	70.3	12.2	17.3
	F	100.00	73.5	14.2	12.3
1911	P	100.00	75.1	10.9	14.0
	M	100.00	73.9	10.7	15.4
	F	100.00	77.4	11.2	11.4
1921	P	100.00	76.3	10.2	13.5
	M	100.00	74.0	10.2	15.0
	F	100.00	79.0	9.9	11.1
1931	P	100.00	75.1	9.9	15.0
	M	100.00	74.4	10.2	15.4
	F	100.00	76.5	9.5	14.0
1951	P	100.00	72.7	10.1	17.2
	M	100.00	69.7	11.0	19.3
	F	100.00	80.2	7.6	12.2
1961	P	100.00	73.4	10.6	16.0
	M	100.00	69.2	11.4	19.4
	F	100.00	82.6	8.5	8.9
1971	P	100.00	72.6 (72.5)	10.6 (10.3)	16.8 (16.7)
	M	100.00	70.4 (70.2)	11.3 (11.5)	18.3 (18.3)
	F	100.00	83.0 (83.0)	7.6 ([illegible])	9.4 (9.3)
1981	P	100.00	69.3	12.9	17.8
	M	100.00	66.2	13.9	19.9
	F	100.00	81.6	8.9	9.5

Note : (a) Primary Sector includes Census Categories (i) Cultivators, (ii) Agriculture Labourers, (iii) Livestock, Forestry, Fishing, Hunting and (iv) Mining and Quarrying; (b) Secondary Sector includes Census Categories, (v) Manufacturing and (vi) Construction; (c) Tertiary Sector includes Census Categories (vii) Trade and Commerce, (viii) Transport, Storage and Communication, (ix) and Other Services.

Figure in brackets present excluding Assam.

The 1971 and 1981 figures relate to Main workers only.

Source : (i) IAMR, Fact Book on Manpower, Population and Labour Force, New Delhi, 1979.

(ii) Census of India, 1981 Series I - India Part II - Special, Report and Tables Based on 5 per cent *Sample Data, New Delhi, 1983.*

TABLE 2.5

Percentage Occupational Distribution of Working Force (Main Workers) by Sex, 1971 and 1981

	Occupational Division	1971*			1981*		
		Persons	Males	Females	Persons	Males	Females
	1	2	3	4	5	6	7
0-1.	Professional, Technical and Related Workers	2.73	2.71	2.84	3.19	3.17	3.25
	2. Administrative, Executive and Managerial Workers	0.93	1.12	0.08	1.04	1.26	0.13
	3 Clerical and Related Workers	2.92	3.40	0.68	3.35	3.93	1.07
	4. Sales Workers	4.17	4.74	1.46	4.50	5.36	1.51
	5. Service Workers	3.31	3.36	3.12	3.05	3.14	2.72
	6. Farmers, Fishermen, Hunters, Loggers and Related Workers	72.07	69.80	82.67	68.66	65.49	81.20
7-8-9	Production and Related Workers, Transport Equipment Operators and Labourers	13.43	14.39	8.94	15.23	16.66	9.57
	10. Workers not classified by occupations	0.44	0.48	0.21	0.90	0.99	0 55
	Total	100.00	100.00	100.00	100.00	100.00	100.00
	(Total figures in 000's)	176397	145379	31017	222516	177543	44973

*Excludes Assam.

Source: 1971 and 1981 Census Reports.

TABLE 2.6

Employment in Public and Private Sectors (Organised Sector) 1961, 1971 and 1981

Year	*Employment (in lakhs)*			*Growth Rate (annual)*		
	Public	*Private*	*Total*	*Public*	*Private*	*Total*
1	*2*	*3*	*4*	*5*	*6*	*7*
1961	70.5	50.4	120.9			
1971	107.1	67.4	174.5	5.2	3.4	4.4
1981	154.8	74.0	228.8	4.5	1.0	3.1

Source: Directorate General of Employment and Training.

TABLE 2.7
Progress of Literacy, 1901-1981

Census Year	*Percentage of Literates to Total Population*		
	Persons	*Males*	*Females*
1	*2*	*3*	*4*
1901*	5.35	9.83	0.69
1911*	5.92	10.56	1.05
1921*	7.16	12.21	1.81
1931*	9.50	15.59	2.93
1951**	16.67	24.95	7.93
1961	24.02	34.44	12.95
1971	29.46	39.45	18.72
1981***	36.23	46.89	24.82

Note: Literates refer to those who can read and write with understanding.
Children aged 0 to 4 are treated as illiterates.
* For undivided India.
**Excludes Jammu & Kashmir
***Excludes Assam.

Sources : Census of India, 1981 Series I—India — Key Population Statistics
Based on 5 per cent Sample Data, New Delhi, 1983.

TABLE 2.8

Educational Level of Population, All-India, by Sex, 1961, 1971 and 1981

Educational Level	*1961*			*1971**			*1981**		
	Persons	*Males*	*Females*	*Persons*	*Males*	*Females*	*Persons*	*Males*	*Females*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Illiterate	75.97	65.54	87.04	70.51	60.47	81.31	63.77	53.11	75.19
Literate (without Educational Level)	15.13	21.35	8.53	9.68	12.33	6.83	11.13	13.78	8.29
Primary	7.03	10.04	3.83	10.53	13 69	7.15	11.42	14.20	8.44
Middle				5.23	7.39	2.91	6.37	8.43	4.16
Matriculation or Higher Secondary				3.27	4.94	1.48	5.68	8.10	3.10
Non-technical Diploma or Certificate not equal to Degree	1.87	3.07	0.60	0 09	0.13	0.04	0.03	0.04	0.02
Technical Degree or Certificate not-equal to Degree				0.08	0.11	0.03	0.17	0.27	0.07
Graduate Degree and above									
Total				0.61	0 94	0.25	1 43	2.07	0.73
	100 00	100 00	100 00	100 00	100 00	100.00	100.00	100.00	100.00
Total figures in 000's	436937	226146	212791	533535	276335	257199	665288	343990	321357

*Excludes Assam.

Source. (i) Census of India, 1961, Vol. I, Part II (ii), Social and Cultural Tables New Delhi

(ii) Census of India, 1971, Series I, Part II, Social and Cultural Tables, New Delhi.

(iii) Census of India, 1981, Series I - India, Report and Tables Based on 5 per cent Sample Data, New Delhi, 1983

TABLE 2.9

Educational Level of Population, All India, Rural by Sex, 1961, 1971 and 1981

Educational Level	1961			1971*			1981*		
	Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
1	2	3	4	5	6	7	8	9	10
Illiterate	80.99	70.90	91.44	76.31	66.25	86.91	70.34	59.22	82.05
Literate (without Educational Level)	13.29	19.99	6.34	8.42	11.48	5.19	10.50	13.76	7.07
Primary	5.02	7.86	2.09	9.55	13.16	5.75	10.23	13.57	6.73
Middle				3.81	5.90	1.61	4.99	7:16	2.70
Matriculation or Higher Secondary				1.62	2.72	0.45	3.31	5.26	[illegible]27
Non-technical Diploma Certificate not equal to degree				0.09	0.15	0.04	0.03	0.04	0.01
Technical Degree or Certificate not equal to degree				0.03	0.05	0.C[illegible]	0.10	0.15	0.04
Graduate Degree and above	0.70	1 25	0.13	0.17	0.29	0.04	0.50	0.84	0.13
Total				100.00	100.00	100.00	100.00	100.00	100.00
Total figures in 000's	360000	185357	176643	425709	218345	207364	507608	260054	247554

*Excludes Assam.

Sources: (i) Census of India, 1961, Vol. I, Part II (ii), Special and Cultural Tables, New Delhi.
(ii) Census of India, 1971, Series I, Part II, Special and Cultural Tables, New Delhi.
(iii) Census of India, 1981, Series I - India, Report and Tables Based on 5 per cent Sample Data, New Delhi, 1983.

TABLE 2.10

Educational Level, All-India. Urban by Sex, 1961, 1971 and 1981

Educational Level	1961			1971*			1981*		
	Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
1	2	3	4	5	6	7	8	9	10
Illiterate	53.03	42.51	65.48	47.63	38.76	57.95	42.60	34.17	52.18
Literate (without Educational Level)	23.54	27.20	19.22	14.66	15.51	13.68	13.15	13.82	12.39
Primary				14.43	15.69	12.96	15.23	16.18	14.15
Middle	16.18	19.38	12.38	10.82	12.97	8.32	10.83	12.37	9.08
Matriculation or Higher Secondary	0.42	8.07	2.29	9.80	13.20	8.76	13.31	16.89	9.23
Non-technical Diploma or Certificate not equal to degree	0.28	0.40	0.14	0.05	0.05	0.06	0.06	0.05	0.06
Technical Degree or Certificate not equal to degree	0.12	0.19	0.03	0.24	0.34	0.11	0.40	0.62	0.16
Graduate Degree other than Technical Degree				1.53	2.19	0.75	2.96	3.94	1.84
Post-graduate Degree other than Technical Degree	1.13	1.78	0.35	0.41	0.59	0.21	0.77	1.01	0.51
Technical Degree or Diploma equal to Degree or PG Degree									
Engineering and Technology	0.07	0.12	—	0.14	0.26	0.01	0.22	0.41	0.01
Medicine	0.86	0.10	0.02	0.10	0.16	0.04	0.15	0.22	0.07
Agriculture, Veterinary and Dairying	0.01	0.02	—	0.01	0.03	—	0.02	0.04	—
Teaching	0.09	0.11	0.07	0.15	0.15	0.15	0.30	0.28	0.32
Others	0.07	0.12	0.02	0.01	0.01	—	—	—	—
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total figures in 000's	78936	42789	36147	107825	57990	49835	157680	83876	73804

*Excludes Assam.

Source: Same as on Table 2.9.

TABLE 2.11

Percentage Distribution of Working Force of India by Educational Level and Sex, 1961, 1971 and 1981

Educational Level	1961			1971			1981*		
	Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
1	2	3	4	5	6	7	8	9	10
Illiterate	72.86	62.82	94.66	62.85	57.42	88.79	57.46	50.65	34.45
Literate (without Educational Level)	17.11	23.38	3.52	9.91	11.30	3.27	9.88	10.34	4.11
Primary				13.65	15.71	3.07	13.82	16.01	5.15
Middle	7.29	10.03	1.33	6.90	8.87	1.36	7.95	9.40	1.92
Matriculate/Secondary				5.09	5.81	1.67	6.55	7.72	1.92
Higher Secondary/Intermediate/Pre-Uni.							1.94	2.30	0.50
Non-Technical Diploma or Certificate not equal to degree	2.74	3.77	0.49	0.18	0.15	0.17	0.07	0.06	0.08
Technical Diploma or Certificate not equal to Degree				0.16	0.16	0.17	0.39	0.40	0.33
Graduate and above				1.26	1.38	0.70	2.74	3.04	1.54
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total (figures in '000)	188676	129171	59505	188485	149146	31329	222516	177543	44973

*Excludes Assam.

Source: Census Reports of 1961, 1971 and 1981.

TABLE 2.12

Percentage Distribution of Working Force of Rural India by Educational Level and Sex, 1961, 1971 and 1981

Educational Level	*1961*			*1971*			*1981**		
	Persons	*Males*	*Females*	*Persons*	*Males*	*Females*	*Persons*	*Males*	*Females*
1	2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Illiterate	77.86	68.61	95.65	68.85	63.54	91.58	64.54	57.69	88.22
Literate (without Educational Level)	15.52	21.92	3.19	9.62	11.16	3.04	9.33	10.88	3.94
Primary				12.93	15.10	3.59	13.17	15.58	4.81
Middle	5.60	7.98	1.04	5.37	6.40	0.95	6.59	8.04	1.56
Matriculation/Secondary				2.64	3.14	0.55	4.10	5.05	0.83
Higher Secondary/Intermediate/ Pre.Uni.							1.06	1.33	0.14
Non-Technical Diploma or Certificate not equal to Degree	1.02	1.49	0.12	0.19	0.20	0.15	0.05	0.06	0.05
Technical Diploma or Certificate not equal to Degree				0.06	0.06	0.05	0.21	0.22	0.19
Graduate & above				0.34	0.40	0.09	0.95	1.15	0.26
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total (figure in '000)	162246	106751	55495	148478	120472	28006	176434	136831	39603

*Excludes Assam.

Source: Same as on Table 2.11.

TABLE 2.13

Percentage Distribution of Working Force of Urban India by Educational Level and Sex, 1961, 1971 and 1981

Educational Level	*1961*			*1971*			*1981**		
	Persons	*Males*	*Females*	*Persons*	*Males*	*Females*	*Persons*	*Males*	*Females*
1	2	*3*	4	*5*	6	*7*	8	9	*10*
Illiterate	42.18	35.21	81.14	35.10	31.58	65.36	30.41	26.97	56.54
Literate (without Educational Level)	26.92	30.30	8.01	11.22	11.92	5.16	8.15	8.52	5.33
Primary				16.98	18.23	6.28	16.33	17.47	7.64
Middle	17.63	19.85	5.21	14.01	15.08	4.83	13.18	14.31	4.64
Matriculation/Secondary							15.92	16.69	10.02
Higher Secondary/Intermediate/Pre. Uni.	9.36	10.40	3.57	16.43	17 05	11.07	5.28	5.56	3.18
Non-Technical Diploma or Certificate not equal to degree	0.46	0.49	0.30	0.12	0.09	0.36	0.11	0.08	0.34
Technical Diploma/Certificate not equal to degree	0.28	0.30	0.18	0.63	0.57	1.15	1.04	1.00	1.36
Graduate Degree other than Technical Degree				3.26	3.35	2.49	5.95	6.03	5.31
Post-Graduate Degree other than Technical Degree	2.41	2.67	0.90	1.06	1.04	1.29	1.77	1.70	2.29
Engineering and Technology	0.17	0.20	—	0.39	0.43	0.03	0.66	0.74	0.07
Medicine	0.16	0.17	0.14	0.29	0.27	0.48	0.40	0.36	0.71
Agriculture and Dairying Veterinary	0.03	0 03	—	0.04	0.05	—	0.01	0.01	—
Teaching	0.23	0.19	0.49	0.41	0.28	1.47	0.74	0.51	2.53
Others	0.17	0.19	0.06	0.06	0.06	0.03	0.01	0.01	0.02
Total	100.00	100 00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total (figures in '000)	26430	22420	4010	32007	28674	3333	46082	40712	5370

*Excludes Assam.

Source: Same as on Table 2.11.

TABLE 2.14
Percentage Distribution of Male Unemployed in Urban India by Educational Levels, 1955-56, 1972-73 and 1977-78

Educational Level	*Urban*		
	1955-56	*1972-73*	*1977-78*
1	*2*	*3*	*4*
Illiterate	12.43	8.96	7.38
Literate but below Matric	63.96	53.60	51.56
Total below Matric	76.39	62.56	58.94
Matric but below Graduate	20.12	27.21	28.59
Graduate and above	3.45	10.23	12.47
Total Matric and above	23.57	37.44	41.06
Total	(100.00)	(100.00)	(100.00)

Source: NSSO 9th, 27th and 32nd Rounds Reports.

PART TWO

Appropriate and Inappropriate Human Resource Development Programme

CHAPTER III

EDUCATION AND THE ECONOMY*

Search for the Relationship

Economists have known for a long time, and particularly appreciated, that people are an important part of the wealth of nations. They have also appreciated that the contribution made by labour to output is larger to-day than it used to be in the past. Adam Smith included all acquired useful abilities of the inhabitants of a country as part of the capital.

There has, however, been always a dichotomy in the approach to introduction of human beings as an element in the productive system for the economy. One stream of thought which originated with British classical tradition, notwithstanding the potent suggestions of Adam Smith, clearly distinguished labour and capital as separate agents of production. This developed in response to the early stages of industrial revolution, when a sharp distinction between capital goods and raw labour power made more sense than it does under the modern industrial conditions, and when, moreover, the distinction between wages, profit and rent as returns to factors of production corresponded also to division of the society into politico-economic classes.

Marshal, who dominated the English economic thinking in the subsequent period held that while human beings were indistinguishable from capital, from an exact and mathematical point of view estimates of returns of different factors of production under a market framework were more easily obtained when these were treated separately. This tradition has been reinforced by the impact of Keynesian general theory with its emphasis on fixed capital investment as the key variable in the economic system, and its assumption of homogenous labour force of a given quality, and by the subsequent expansion of the Keynesian short-term equilibrium model into Harrodian growth model.

* Adopted from Development of Human Resources : Population Policies and Manpower and Employment Policies. A report prepared by the author for India under a programme of States on Cooperation and Development - South Asia.

There was another strand of thought in economics whose foundation was laid explicitly in Fisher's classic work on capital and income. Fisher regarded capital as including anything that *yielded income, and income as the yield of capital. Thus, from the Fisherian point of view all categories of income describe returns from various forms of capital,* and could be expressed as rates of interest on the corresponding item of capital. Equivalently all forms of income yielding assets could be given appropriate capital values by capitalising the income yield with appropriate rate of interest.

It follows from this that the growth of income that defines economic development is necessarily the result of accumulation of capital or of investment which, in the context, should include such diverse activities as adding to material capital, increasing the health, discipline, skill and education of human population, and application of existing knowledge for increasing the efficiency of production.

Although, both lines of thinking were present in economic literature and were studied it was the approach of the English classical and neoclassical economists which generally became the basis of economic analysis both for short-run pricing purposes and for long-run dynamical studies.

Lately there has occurred some shifts in economic emphasis. The shift has been contributed by increasing use of statistical and econometric techniques for analysis of economic events. One of these areas engaged in finding out or in identifying the relative contribution of labour and capital to increase in economic output of countries. Three most important studies in these areas are those made by Solow, Kendric and Grilliches.

Solow, with the assumption of a linear homogenous production function and neutral technology improvement found that no more than 20 per cent of U. S. output per man-hour in the years between 1915 and 1955 could be accounted by growth of physical capital and labour leaving a residual of about 80 per cent for which no basic economic input could be taken as a contributing factor.

Kendric of the National Bureau of Economic Research, found out that for US economy over the period between 1889 and 1957, the combined input index increased at an average rate of 1.9 per cent per year, and that the output index increased about 3.5 per cent per year, and that the output index increased about 4.5 per cent per year, leaving a residual increase of 1.6 per cent per annum. The contribution of the residual as percentage of the increase of output per unit of labour input. was about 80 per cent.

In both these studies, labour input has been measured in man-hours thus obliterating all distinction between work by unskilled labour and very high skilled labour. The capital in both these studies was measured in constant prices on element of cost basis so that changes in the qualities of capital over the period were not emphasized in the estimates. Thus, the above empirical results came to be interpreted as evaluation of the contribution of knowledge, skill and scientific capabilities to economic growth.

Grilliches started with a study of social return to investment in research on hybrid corn. Subsequently, in connection with his work on aggregate production and technological progress in selected sectors of the American economy, he found out that the rising levels of education made a significant contribution to productivity in both agriculture and manufacturing industries.[1]

The interpretation, more particularly the conclusion, that growth of labour and capital makes marginal contribution to the growth of national product, emerging from the above-mentioned studies, have been questioned variously. It has been argued that the way the capital series were measured for these studies, these did not serve as instrument for the introduction of technical change into production processes; these were simply built up as if wooden ploughs piled up on the top of existing wooden ploughs.

Another way of making essentially the same point was that the decline in the constant price capital output ratios was observed only because the available indices of capital input failed to reflect improvement in the quality or productivity of capital. It was also argued that if capital was measured differently, reflecting the improvements in the quality or productivity of capital overtime, the residual in the production function could possibly have disappeared.

In a more general sense it was also held that the residual as usually measured in models was the result of secular improvement in the quality of capital assets; that it also encompassed changes in output attributable to economies of scale, to improvements in the labour force, to formal as

1. Solow · The technical change and the Aggregate Production Function in Review of Economics and Statistics, 1957.

Kendric : Productivity Trends in the United States : Princeton University Press, 1961.

Grilliches : Source of Measured Productivity Growth in U. S. Agriculture, 1940-60, Journal of Political Economy, 1963; Research expenditure, Education and the agriculture production function, American Economic Review, 1964 and Notes on the Role of Education in Production Functions & Growth Accounting in Education Income and Human Capital, National Bureau of Economic Research, 1970.

well as informal education, to change in the product mix, to reorganisation of the economic order, and to so many things of such sort. Thus, it was held that the extent of the residual observed in the production functional analysis should be called merely a measure of our ignorance.[2]

Schultz on the other hand, carried out an empirical analysis of the aggregate input-output data in which he explicitly linked his analysis with a theme of investment in human capital forms. He tried to explain the riddle of the economic growth process associated with the decline in the long period behaviour of the capital-income ratio by suggesting that the total social capital for purpose of co-relating with the national income should contain not only the whole amount of physical capital but also the human capital.

The only interpretation, therefore, according to him, of the fall of physical capital income ratio was that the ratio of human capital to physical capital was increasing every year. On the side of empirical estimation of various aspects included in his thesis, he developed series of human capital formation taking into account the value of student time as labour input into capital formation process, and showed that earnings forgone accounted for over half of the total cost of secondary and higher education in the United States and that over the period from 1900 to 1956, total investment in human capital formation in schools rose from 9 to 34 per cent of the total investments in physical capital formation.[3]

One can leave aside for a moment the issue of the interpretation of the residual turned out by the aggregative production function analysis and concentrate on the facts brought out by such analysis. It is implicit in the constant price capital series used for this analysis that capital items needing equal quantities of material and man-hour inputs for their production were treated equal to each other, regardlessly of their output productivity; that, similarly, capital items needing say two times more material and man hour input than another set of capital item were taken to represent two units of the latter sorts of capital item, though the ratios of their productivities could be different from each other.

In other words, the capital and man hour series used for this analysis represented, in effect, the quantities of material and man hour inputs used for production of goods and services in different years. Thus, one interpretation of the facts is that the growth of material and man hour

2. Abramovita : Review of Denison's Book - The Source of Economic Growth in the United States in the American Economic Review, 1962.

3. T. W. Schultz : Capital Formation by Education Journal of Political Economy, December 1960.

inputs contributed, at the most, 20 per cent of the annual observed growth of the U.S. economy. As the labour inputs measured in man hours takes account merely of the physical part of labour, it is also concluded from the above facts that growth of physical inputs contributed only about 20 per cent of the annual observed growth of the U.S. economy.

Since in the capital and man hour series used for this analysis all physical inputs were accounted in their basic and given physical forms, the remaining part of the growth should be ascribed to non-physical inputs which might have entered into the production aspect. Examples which come up in this regard are organisational improvement, changes in design and capacities of the equipment, economies of scale and changes in product mix on one side, and on the other, improvement in the health of the labour force, improvement of productive qualities of the labour achieved through education and training and growth of knowledge.

The improvement in the design and capacities of equipment, and generally, in the overall technology for transformation of inputs into various forms of output is merely one form of crystallization of knowledge possessed by the individuals in the society. Similarly, improvement in the health is also a crystallization of the knowledge of the medical/biological sciences and technology possessed by the community.

In a generic sense, therefore, all such improvements are results of transference of human knowledge and skill to productive use. As growth of knowledge and skill is proportional to the growth of educational and training achievements of the population, in special circumstances it is also possible to use measure of growth of educational attainments of the population as index of growth of knowledge and skill of the population.

Thus, in a way, one returns to the original interpretation that the contribution to economic growth in the United States came either from the growth of knowledge and skill of the population, or, from growth of educational attainments of the population being the cause of the growth of knowledge and skill.

Many policy objectives emerged from the analysis of the above facts. Most generally, it developed an emphasis on expansion of education and training facilities as a means for increasing the rates of economic growth in most under developed countries. Secondly, as human beings with their skill and competence were identified as elements of capital formation in the same manner as other elements of physical capital the emphasis on evaluation of education and training programmes through uses of rates of returns approach was also developed. Thirdly, emphasis also developed

on work in the direction of what has been called manpower planning approach to educational programming. It involved working out of estimates of requirements of different categories of educated manpower for conduct of socio-economic activities at future dates, and estimating backward therefrom the requirements of intake and enrollment for various courses of education so as to obtain balance between requirements and supplies of various categories of educated manpower.

These policy objectives, and actions thereon, were adopted most readily by the under developed countries which looked forward to achieving a high rate of economic development for removing the inordinate deprivations to which these societies were submerged through generations. It is sufficient to note at this stage that extent of contribution which human resource development made to economic growth process in the United States did not materialize in this country, though such policies were vigorously pushed here.

In a way the pitfalls and fallacies in an admittedly over simplified chain of reasoning presented above were too numerous. It was suggested by Balogh and Streeten even in 1963, when the facts of residual contribution came to light and when these were being analysed in great detail that even if improved knowledge were a necessary condition for production and growth it might yield output only if incorporated in machine, exploited in specific ways, or combined with other policies but not occuring in isolation.

It was added that the education was not homogenous input, and aggregation of all types of education obscured the type of education required for development; that, isolation of education from other measures ignored the importance of coordinating policies, that the aggregation of all investment in human capital and its separation from investment in physical capital not only obscured the complementary nature of most sub-groups of the two, but also served as an intellectual and moral escape mechanism from unpleasant social and political difficulties.[4]

The most important aspect to note in this context is that the relationships revealed by the analysis of the above-mentioned data mainly suggest that under certain circumstances it is possible to obtain a rate of economic growth much higher than what is implicit in the rates of growth of utilisation of physical inputs. The numerical relationship should not be read as a numerical law of nature; and, in any case, that it is not so is fully illustrated by such facts that in other societies a similar numerical

4. Balogh and Streeten : Planning of Education in Poor Countries in Economics of Education vvl.I (Ed : M. Blaug Perguin Books).

relations did not emerge for comparable rates of growth of physical resources and levels of human resources development.

The aspects for emphasis in this context are not the observed numerical ratios but the existence of possibilities for obtaining rates of economic growth higher than those implicit in the growth of physical inputs. Read in the latter manner, interest in the above facts is focussed not in the numerical relations but in efforts to understand the processes through which such possibilities ultimately materialise.

From the above point of view one is, therefore, led to analysing how as a matter of fact knowledges get crystallized into forms which yield higher rate of output for given quantities of input use, how such knowledges are obtained by the economic establishments which ultimately lead to improvement of their technologies and lastly, how such knowledges could be developed in the society. Thus, what is needed is an understanding of the process of knowledge formation of transference of the knowledge to work conditions, and of crystallization of the knowledge into improvement of productivity levels.

The Physical Link

Education and training are acquired by individuals either formally in educational institutions or on the job through inplant training and otherwise through experience. For an individual, learning the job, is obviously an opportunity for improvement of his knowledge and skill, and for the occupational advancement of an indiviaual. Such a methodology could be as good as the alternative of learning formally in an educational institution.

A society which, however, depends wholly on facilities of on-the-job learning for improvement of the knowledge and skill of the work force is invariably tied to a given technological level. The individuals learn only that which is in practice, and as a result the same technological practices are passed on from year to year. Such a system, therefore, does not possess the dynamical properties which were the subjects of our discussion in the earlier pages.

Thus in our context, we will concentrate on the type of links between the educational sector and the rest of the society which uses the products of the educational sector. The educational sector performs two roles—develops knowledge through research and transmits the knowledge to the students. The students after acquiring the knowledge carries it with them, and to the extent possible use them in their state of utilization.

An individual on completing a course of education acquires a given quantity of knowledge. Transfer of this individual from the college to a socio-economic establishment is thus a transfer of a quantity of knowledge acquired by the individual while on education to the establishment in question. So long as the industrial establishments depend merely on acquiring individuals from the educational institutions for conduct of their functions such transfer of individual students amounts to acquisition of bits of knowledge by the establishments.

The horizon of knowledge is continualy expanded through research in the universities and colleges and, therefore, the quantity and quality of knowledge carried by each batch of students after a course is completed are necessarily larger and better than the quantity and quality of knowledge carried by the earlier batches of students. Thus, establishments which obtain the manpower from the educational sector in regular streams have always the benefit of fresh knowledges developed in the educational institutions.

Conversely the establishments which obtain persons from educational institutions not in regular streams, but occasionally, invariably get stuck up with levels of knowledge possessed by the individual employees which pertain to the time at which the employees acquired their knowledge. Such establishments, therefore, essentially miss the continuous opportunities of incorporation of advanced knowledge in their production technologies.

In general also the opportunities for improvement of aggregate technology of the society through a methodology of transfer of graduates of the educational institutions to industrial establishments are limited. The total size of the employed work force in any society is invariably much larger than the size of the new entrants to the work force.

Even if these new entrants to the labour force acquire the knowledge of the most modern forms of science and technology, and are added forthwith to the work force, the marginal addition to knowledge in the existing level of knowledge in proportional terms is too small to bring about radical improvement in the aggregate level of knowledge possessed by the work force.

There are other problems also which might make even the above marginal additions of knowledge to the aggregate level of knowledge of the work force in-effective. It has been noted in the data thrown out by an investigation of Delhi Industrial Establishments that most positions which become vacant either due to death or retirement of employed persons or due to programme of expansion of the industrial

establishments are filled either by internal promotion or by drawing persons from other establishments.[5]

The products of the universities in most cases are forced to enter industrial employment only at relatively lower level of positions. At that particular level, in most cases, these boys from the universities obtain very little opportunities for use of the knowledge which they acquired during their education. However, by the time they reach appropriate positions where such knowledge could be used they totally forget what they learnt during their academic days. Thus, though individuals with advanced knowledge are steadily added to the work force in every society the knowledge thus obtained by the socio-economic establishments is never capable of being used effectively for necessary improvement of their technology.

In general therefore, it is evident that because of the variety of dimensions of the problems, and of the particular structure of industrial work and employment, a system where flow of knowledge depends merely on transfer of manpower from the university sector to the industrial establishments is not capable of ensuring parity, therefore, between the state of technology in the industrial sector and the state of knowledge in the society.

The detachment of the level of knowledge of the industrial establishments from the level of knowledge at the university which is the result of the situation discussed above has also other implications. In a way, such a situation also creates a feeling that the technology of the establishments has to depend for its development not on the contributions of the university sector but on their own contributions. It has two parallel effects. First, the industrial problems whose resolution could constitute technological advances in the industries do not become subjects of investigation in the academic institutions.

In particular, the areas of research in the university do not cover aspects which have bearing on the socio-economic activities of the time. As a corollary, the knowledges development in the universities through researches are not generally useful for resolving various technological problems faced by the industrial establishments. The second aspect of this situation is that the new dimensions of knowledge developed in the universities through researches are not connected with the socio-economic life of the society. The knowledge thus developed, and correspondingly passed on to the students during their academic days, are

5. Institute of Applied Manpower Research : An Assessment of Requirements for Skilled Manpower, New Delhi, 1962 (cyclostyled).

not also of such sort which could be used by them for meeting industrial needs.

In other words, when the link between the university sector and the rest of the economy is only through the manpower transfer, there is every possibility that in the course of time such link will fail to carry knowledge from the university of a sort which could be beneficial to the establishments. It also follows that those societies which have only this type of link for availing advantage of growth of knowledge for improvement of technology and productivity would invariably fail to obtain benefits of educational development for augmenting economic productivity.

There are two aspects which are crucial in this regard. The first is: for continuous improvement of technology and for continuous improvement of the quality of manpower employed in the various forms of economic activities it is essential that disparity between the level of knowledge which is available in the society and that possessed by the work force should be reduced.

In other words, in order that the industrial activity can benefit from continuous growth of knowledge in the society it is necessary to ensure that the level of knowledge possessed by the employeu work force continuously improve and become as upto date as possible.

The other aspect of the problem is that the type of knowledge which are developed in universities and the issues which are faced by the industrial establishments may not be consistently related. As the problems faced by the industrial establishments continuously change the structure of knowledge needed for resolving industrial problems would also change continuously.

Thus, in order that the universities may remain abreast of the types of problems faced by the industrial establishments and of the types of changes in the structure of problems faced by them, a separate type of link between the universities and the industrial establishments through which information can flow continuously for regulating the programme of research in the university sector is necessary.

It also follows, therefore, that between the university sector and the rest of the economy links of various sorts are necessary. Some of these links are mere information flows, and some are positive inter-actions between the university and the rest of the economy. In one plane, it involves arrangement by which the level of knowledge of the employed persons are continuously up dated for bringing down the gap between the average level of knowledge of the industrial workers and the average knowledge of fresh products of the university.

For reorganising the structure of knowledge so that it becomes relevant to socio-economic life of the community a different type of linkage would also be necessary. This might involve indulging in researches which have bearing on problems faced by the industrial establishments. Such reorganisation should also touch the structure of curricula so that the products turned out by the university are immediately useful for industrial employment.

Economy and the Relevant Structure of Knowledge

Economic activity is conventionally divided into number of industrial areas Although such division was not made keeping regard to variety of conceptual issues which might be associated with this division yet in a way the division of the economic activity into industrial areas has extreme significance.

The broad divisions are agriculture, forestry and fishing; mining; manufacturing; water, power, and sewerage; transport and communication, banking and commerce; administrative services and personnel services. The industrial divisions of agriculture, forestry and fishing primarily concern with extracting benefits from natural phenomena which have basic reproductive qualities.

In some cases, as in fishing and live-stock rearing, the economic activity centres on extracting benefit from the large naturally reproductive abilities of the animal abilities species which in other cases were to be wasted or destroyed under the forces of natural selection within the animal world.

The advantages in these regards were obtained by domesticating the animals so as to save the off-springs from being lost or destroyed and by providing facilities so that the reproduction at natural rates might occur.

In the case of agricultural crop production also the economic activity primarily involves taking advantage of the facts that the seed required for the production is much less than the output so that with better husbanding a part of the output could always be taken out for supporting the human beings without affecting the reproduction of the crops. Thus controlled and organised maintenance of the reproductive behaviour of the plants constituted the basic economic activity.

In the area of mining the economic activity concerns with extracting from the earth whatever could be found useful for purposes of supporting life. The issue in this area was not taking advantage of the reproductive ability of natural products but using in different ways the stocks of natural

products available in various forms.

In mining of coal and metal, it involves the physical activity of digging raising, transportation, together with (in some cases) melting and other sorts of processing for getting rid of the impurities associated with the useful material, or for separating variety of useful materials which are found in associated form

The industrial activity of manufacturing involves further processing of the materials, obtained either through agricultural activities or through activities of mining, for making these useable. In most cases, it involves changing the physical shapes and forms of the materials. In some cases, the activities are merely physical engineering; in some cases, chemical engineering is involved; and in many others both physical and chemical engineering process are involved in changing the shape and form of the materials.

The industrial activity under the heading "Power" concerns with generation of power which amounts to releasing of power contained in various materials. In all these cases it involves various chemical and physical processes by which power contained in materials can be released and carried for different uses.

The industrial activity of transportation is merely physical transportation of goods from one place to another place. Similarly, the industrial activity of water and sewerage consists of taking water from one source and of distributing it to various places for uses therein. The sewerage activity also involved similar movement of materials.

All the above activities, thus, involve various forms of physical and chemical processing, associated with movement of materials. Conduct of all these activities in physical sense require power and efforts. Thus, how much of such activities can be conducted, and correspondingly how much output can be produced, depend upon two distinct features (1) how much power can be made available for performing the variety of activities; and (2) how much power which has been available can be really used for performing the activities. Both are, therefore, the most crucial features for determining how much output the society is capable of producing during any period of time.

In the earlier days the activities were conducted solely by the use of physical power which human beings were capable of supplying. Subsequently men also learnt that human power could always been added by taking advantage of the power contained in animals and in variety of natural resources. Thus, in significant ways, air and water flows and such other features were used for augmenting the supplies of power for

conducting various economic activities.

Although the economic activity has been described above in a very simplified manner, essentially the above is correct and adequate for understanding the inter-relationships between science and economic activity. The action orientation of all activities under the first group of industrial divisions highlighted in the above description was deliberate and was intended for linking output of the activities with the input of power. This was also intended to show how the rate of output depended on human actions, including human actions directed to increasing and aiding the physical capacities of individuals.

Even the activity of producing power and of using power for increasing physical capacities of individuals are parts of human action and are activities themselves of human beings.

The aspects of knowledge of physical and natural phenomena and processes which involved in the economic productive activities are also implicit in the above discussions of the nature of productive activities. An essential element of knowledge in this regard is the identification of the sources containing power and the quantities of power contained in those sources. Part of this knowledge was obtained by generalisation from experiences; and in part it was obtained by analysis and investigation and studies. The knowledge of the numerical measures of the quantities of power contained in various sources were also to a large extent dependent upon development of appropriate concepts and upon study and analysis in which the concepts were used.

The aspect of generation of power, that is extraction of power from the sources containing that, on the other hand, involves conduct of variety of actions. This variety, the order in which these actions will be conducted, and the methods for conduct of each individual action are aspects which go beyond scientific knowledge and are conveniently characterised as technology. In essence, there is need for distinguishing pure knowledge regarding the inter- relationships among various factors and technology which involves conducting various activities for producing goods and commodities.

The distinction between the knowledge of science and the knowledge of technology is, therefore, vital for appreciating the role each has in the economic growth process. The contribution of science to economic development, in a very abstract sense has been enormous. But in concrete plane, it has been the development of technology which made the use of scientific knowledge for purposes of economic development possible.

The knowledge of science is universal. Whatever is developed through scientific studies, investigation and experiments is immediately brought to the knowledge of others. Thus, in a way, there is very little distinction among the nations in respect of the level of scientific knowledge. In every society individuals can be found who possess the most advanced knowledge about various aspects of science. Moreover, the access to this knowledge is also unrestricted, so that by and large societies can also increase the level of their scientific knowledge as much as the level possessed by any other society.

The difference in the level of production and the level of economic development of the different societies, therefore, is traceable not to the level of scientific knowledge but to the level of technology in use in different societies. It also follows that for accelerating the process of economic development, the societies require to improve their technology more than anything else. The knowledge of the aspects of technology therefore, requires to be improved and progressively incorporated in various forms of productive activities. In other words, the most important aspects of the process of economic development are the possession of the knowledge of technology for conduct of various forms of activities and secondly the use of that knowledge for conduct of the different types of activities in the society.

Issues of Manpower Planning

The contribution which knowledge and skill is capable of making to economic growth process has been highlighted in the earlier pages. Subsequently, it has also been shown that all forms of knowledge and skill do not have equal capacities for yielding economic results; that, in extreme cases all efforts towards providing knowledge and skill could become totally infructuous from the economic side ; that; unless the output of knowledge and the production sector bear with one another specific relationships, society would never benefit from human resources, and correspondingly, would never acquire the vigour which characterized the past growth of other developed countries.

The active role which manpower is capable of playing in bringing about increases in the rate of economic development was never stressed in the previous manpower planning efforts; whereas, the very significance of the use of the term of manpower in place of labour lay in the appreciation of this active role. On the other hand, a unit of labour, which is an input in a production process like all other forms of physical

inputs, is not also easily distinguishable from the other forms of inputs.

In traditional economic analysis the character of the input of labour was not distinguished from that of other forms of input. Labour was also taken as substitutable for other forms of inputs in the production of goods and services. In a way, these features of the labour which made labour one of the input forms like others, were kept in the forefront while determining the basic issues for manpower planning in the traditional approach. In its manpower role, on the other hand, man could be an agent for growth, rather than an input for a kind of physical output.

The emphasis on the labour aspect of manpower also affected the choice of issues for manpower planning. The estimation of demand and supply of manpower categories and attempts to find ways for balancing these two became, so to say, the major element of manpower analysis in most countries. What is known as the manpower requirements approach went even further and adopted fixed input ratios as basis for estimating the demand for different categories of manpower.

Issues of substitution between different categories of manpower in the context of production of given forms of output were also raised for determining the demand for manpower. In a way, most economic tools and analytical techniques for evaluating the demand and supply of any form of physical input were used for analysis in the manpower side also.

In some cases, manpower came to be treated not as a current input form but as a form of capital. In this approach, manpower and capital were treated as substitutes and the demand and supply of manpower came to be determined in the same way as the demand and supply of capital were determined in economic analysis. The rate of return on investment on education and on investment on other forms of physical capital were also used as price for determining the demand and supply of manpower categories.

The role accorded to manpower in the above approaches was, therefore, passive. Its utilization was linked with the production of output; and the quantity of its utilization was made dependent on the aggregate volume of production of economic goods and services or on the rate of growth of production of goods and services. The manpower planning also in these circumstances became only passive.

As it was believed that the extent of utilisation of manpower is dependent only on level of economic activity, which is determined by other factors than manpower, the manpower planning reduced merely to analytical exercises involving estimation of demand and supply of manpower of different categories for supporting the exogenously

determined levels of economic activity.

The only operational implication of such exercises was the feed back it provided to the educational sector for production of manpower of appropriate size. Even the educational sector was reduced to a passive agent; it merely received from such analytical exercise indications of the number of persons needed for economy.

In contrast to this passive role of manpower the active role of manpower which has been revealed in the data from developed countries never become the basis for manpower planning in most countries, including India. In this role the manpower does not emerge either as current input of production or as capital input; instead of that, it acquires the role of an agent for bringing about economic development.

Thus, the issue in this context is not how much manpower is required for sustaining a given level of economic growth, but how much manpower is available for contributing to economic growth. In so far as, therefore, manpower is an agent for contributing to growth the societies should have never a surplus of manpower, for the more manpower is available the more can be the extent of growth.

Each individual, however, is not necessarily an agent for growth, though each individual is capable of functioning as an input for certain type of output. There are varieties of labour functions involved in the production of any kind of good. Some of these functions may require special skills and knowledge which individual may acquire; some may require only physical strength of an order which also the individuals acquire with age. In a way, so to say, individuals, on their own, can assume the labour role, depending on their strength and ability and can also provide support for production of varieties of goods and services in the society — indifferently or efficiently.

On the other hand, contribution to growth process by individuals, does not arise naturally. The extent of contributions in different societies, and at different times in each society, have also varied significantly. In one extreme, we have the case of India where the contribution has been in effect negative in that the rate of economic growth has not even been proportional to the growth of physical inputs of capital and manhour, notwithstanding the vigorous expansion of educational achievements of the population during the corresponding period. On the other extreme, we have the case of USA and similar other countries where no more than 20 per cent of the growth of the societies have been contributed by growth of physical inputs including manhours by the workers.

Figuratively, therefore, one might suggest that the contribution to

economic growth by the individuals of a society has only been proportional to the extent of manpower qualities acquired by the individuals and to the extent of the application of such qualities precisely for inducing economic growth. But in this manner, it also follows that only on satisfaction of a variety of conditions the societies are capable of receiving stimulations in growth and development. A programme of action thus also follows for stimulating growth and development of societies. One might, therefore, also suggest that development of such programmes and their execution effectively constitute, so to say, the active manpower planning for growth and development.

The programme has many dimensions. At one plane, surfaces the issues of the content of knowledge and skill, the acquisition of which provides the manpower quality to the individuals. Even this issue is not single dimensional. There are first the questions what should exactly be known todav. and what capacities should be possessed by individuals today, so that the productive capability of the socio-economic establishments are capable of improvement immediately. With the change of time, the problems hindering further improvement of productive ability of the establishments would also change.

Thus, new knowledge and abilities would be necessary for resolving the problems; and these would also require to be developed. In a way, these aspects raise wide variety of issues touching on education, training, research etc., and also on science and technology policy and programmes. What is important for emphasizing at this stage is that for harnessing human resources for accelerated socio-economic developmental process in the societies aspects of education, training, and science and technology should not be dealt in isolation but as a part of overall manpower policy.

At another plane, the manpower planning and policies touch on such aspects as how the knowledge should be applied for resolving the problem which hinder the improvement of productive abilities of the establishments. The knowledge, in any case, has to be acquired by individuals, but to be effective it must also be acquired by appropriate persons and not by any person. The issue can be stated from another side also. Each person employed in the establishments has specific functions, and faces specific problems now and then while discharging such functions. Thus he needs specific knowledge and ability for resolving the problems that he faces.

Similarly, the knowledge needed by another person is different if he conducts altogether different functions. In other words, for effective

application of knowledge, specific form of knowledge and ability must be provided to those who need them specifically.

The knowledge needs of individuals are also dependent upon the technology and production framework within which the persons are working. Thus, the issues of education and training, with an objective that bits of knowledge should succeed in resolving specific problems, cannot be general; the programmes have to be region, activity, and environment specific. Most importantly, the knowledge must be imparted to those who need it most, i.e., the individuals who are engaged in different activities particularly.

Viewed from the side that knowledge is essentially needed for resolving problem, an individual's requirements of knowledge undergoes changes in the course of time. The change occurs not merely because the technology changes, but because the individuals are liable to change their occupations, or their positions within the same occupations, many times in their life time. With such changes the functions also change; and individuals face different types of problems for which additional knowledge and skill are required.

An altogether different aspect is raised in the above context. An organization is most productive when individuals occupying different positions possess a high degree of knowledge and skill appropriate and relevant to the positions they occupy respectively. When such is the case the manpower structure for the organisation can be said to be optimum.

However, the optimum is bound to be unstable, leading to progressive degradation of the efficiency of any organization as day passes. Men die, retire and voluntarily change positions in a natural manner, and the positions vacated by them are occupied by others whose knowledge and capabilities might not be the best in relation to the duties of the new positions, though individually they retained their personnel capabilities and knowledge.

Thus such shifting of manpower in the organisation invariably reduces the aggregate efficiency of the organisation, regardlessly of what happens to the capabilities of the individuals. The degradation occurs for natural reasons and is a continuous feature like the application of the laws of entropy in physical phenomena. It also follows that continuous work has to be performed for preserving the efficiency of the organisation, as also of the societies.

Thus for effective application of knowledge, the programme of education and training of the work force requires to be region, activity, environment and period specific. Determination of the arrangements

required for education and training, of the courses and curricula for specific groups of work force, of the sizes of the population requiring different types of education and training, and of the required changes in these matters from time to time then become crucial for ensuring steady application of knowledge for continuous improvement of productivity. Conduct of those functions in continuous manner thus becomes the other aspect of active manpower planning.

Educational arrangements prevailing in three developed countries are well known. The arrangements are totally different in these countries. In England education of the workers is conducted wholly outside the universities; the system is based essentially on part-time and evening courses. The individuals are some time prepared for university degrees; in most cases, however, they are prepared for diplomas and certificates awarded by the professional societies, in which case the courses and curricula are tied to the requirements of establishments, in so far as the practising professionals are involved in the relevant policy formulations.

In the United States occupational/professional/vocational education is a part of the academic programme of the universities and colleges. The workers obtain the facility for higher education because of course term oriented semester system of education in the universities and colleges.

Individuals may leave the job for a semester term and take relevant courses during the period; they may also take semester courses under evening and part-time arrangements. Credits are given for individuals courses so that the individuals have options for taking only such courses which help them in their respective occupations and professions.

In the Soviet Russia the educational arrangements are essentially for improving the quality of the workforce. The higher educational courses are also linked to specific occupations and professions and their levels. The admission to the individual courses is open only to those who have specific forms of occupational experiences. The number of places in each higher educational course is determined by the number of specialists with this education needed for the economy in consideration of the five year plans of development, including of the productivity improvements stipulated for each activity. This system, therefore, is the illustration of an extreme case in which the needs of knowledge and skill for each occupation (and occupational level) are worked out initially, followed by efforts for provision of the required knowledge and skill to the incumbents of the positions.

The Indian educational system provides the illustration of another extreme case. It provides virtually no facility for imparting required

knowledge to the working population. The courses and programmes being regular, whole time and of long duration, only the younger persons can avail these for their preparation of employment.

On the other hand, since no body would know where exactly individuals after their education would be employed, the courses of education are made more and more general so that they might get employment in many areas. Thus while the knowledge is effective only when it is capable of resolving specific problems, the knowledge that is imparted is always general, and is mostly inadequate for resolving specific problems.

CHAPTER IV

INDIA'S HUMAN RESOURCE DEVELOPMENT PROGRAMME—THE ROOTS

Human resource developmental programme in India was formed around formal educational arrangements during the British days. The complete programme covered education for about 20 years, beginning from the age of five of individuals. In effect, it was a preparation of the children for entering into the adulthood and a regular social life. The academic programme within a liberal ideological framework was established under what may be called university system and led ultimately to award of degrees. The degree was awarded after the individuals had gone through regular courses of education in the schools and colleges.

The education was given primarily in humanities and science. Professional courses were also included under the academic programme but the programme was heavily weighted in favour of arts and science courses. About 90 per cent of the students, even in the 1980s of this century, was enrolled in arts and science courses.

The programme of education was essentially English though the medium of instruction has not always been the English language. The English educational programme has a long history and is ultimately traceable to the early Greek educational system. The evolution of the educational programme has remained intimately connected with the evolution of social and political systems of Europe. Thus, in a way, the educational system introduced in India by the British linked India with Europe in a significant manner.

Besides, the education under the university system there is no other programme of human resource development in India. After the country became free, a variety of technical and professional educational courses have been introduced for the purpose of developing skill and capability

commensurate with the diversification of the economic activities.

These programme have also been developed within the same university framework which is characterised not merely by award of degrees and diplomas and certificates, but also by a unique type of approach towards human resources development. These features are understandable only through an appreciation of the process of evolution of the university system and its academic programme from the early Greek educational system.

Early Greek System

From the earliest days Europe had arrangements for institutional education of the children. More particularly the institutional training of children developed in European societies as extension of the system of education prevailing among the racial tribes which moved into southern parts of Europe. The early Greeks came to Greece in three successive waves and settled. First came the Ionians, then the Achaeans and last the Dorians. While the former two groups were assimilated in the then prevalent cultural forms, the Dorians retained their original Indo-European culture and dominated the further development of Greek pattern. The mainland Greece is mountaneous and in the valleys of these mountains separate groups settled and formed independent colonies and states. Among these, in the earlier days of Greek civilization Sparta and Athens were remarkable for different reasons.

The Spartan system of education represented the essential tribal educational characteristics of the Dorians. The Spartan formed a principality in the southern parts of Europe. It was an aristocratic government formed in a territory which contained native population of its own. The Spartans organised themselves into the ruling community and continued their own traditions for preserving their ancient tribal characteristics and for maintaining their new status of superiority over the conquered population. This they did by closing themselves in rigorous cells, with stringent rules for living in a community formation and for education and training of the young so that the essential traditions and ethos could be passed on from generation to generation and maintained vigorously.

The education and training of the children constituted from the beginning the essential elements of the system, for otherwise neither independence nor preservation of the race could be ensured. The system of training included bringing the children up in community groups under

strict disciplinarians and providing them education of laws, traditions, behaviour and morals and bravery together with capability for turning out into good warriors. The training of boys was designed to toughen them by accustoming them with pain and hardship. Whether they were taught reading and writing is not known but they were made to listen to recitation of poems and were taught music and dancing.

Another state in Greece in those days was Athens. Athens also developed a system of education for the children which included in the curricula, over and above the matters under the Spartan schools, language and literature. The schools were day schools, run as private and not state institutions. The state, however, sometimes built gymnasia and wrestling schools where any one could exercise himself. In the Athenian schools boys learnt to read, to write and to count. Reading would take the boys directly to the great poets. Counting was learnt, along with spelling, by counting the number of letters in words. Simple counting was done on fingers; for more complicated counting boards were used. Music was also an important part of schooling. The gymnastic teacher instructed the boys in boxing and wrestling, throwing javelin and discus and in other exercises.

In the 5th Century B.C., great social and political changes occurred in Athens. Growth of maritime trade, and with it a wealthy merchant class to challenge the older landed aristocracy, brought about political democracy of the free citizens. The democracy was direct without the institution of political party system. In such a situation political power was acquired by individuals with enterprises. The crucial elements in the acquisition of power by the individuals was their capacities for obtaining the support of the largest number of voters through persuasion and demagogy.

This made the capacities for discussion and debate and oratory the most valued quality in the society. For competence in these regards individuals also required capacities for talking on all aspects of social and political life and for engaging in discussions on all subjects in the most cogent manner. Thus developed the system of education in those days by roving teachers called sophists. The sophists went round from place to place and delivered talks and lectures on all relevant subjects which became a popular means for learning various matters for use in future discussions and debates. Parallely with this system of education by the sophists various academies and institutions also developed, possibly more for the purpose of providing debating points against the sophists views than for anything else.

Subjects of education in these academies and schools covered generally literary subjects, which included poetry and criticism of style and grammar and subjects like history, geography, natural history, philosophy, politics, logic, rhetoric, drawing, painting, law and the preparation of speeches. In the academy in which Plato taught geometry and mathematics were also emphasised. All the subjects covered were matters of discussion and courses were conducted for developing individuals into finished speakers and debaters on various aspects.

Rhetoric is a sort of method for impressing others through spoken words. Sometimes in the process messages are communicated; sometimes the effort merely aims at projecting the superior qualities of the speaker and at inviting the confidence of the speaker of the listeners. In the sort of direct democracy prevailing in the Greek States during those days, people could acquire status and power only through projecting themselves as superior to others and capable to deliver the goods, messages in respect of which could be delivered only through verbal communication and oratory.

In a direct democracy each is for himself and against others in the search for status and power. In a situation where rhetoric was the means for acquiring the status, one also answered rhetoric by rhetoric and in the process tried to shake whatever conviction others developed through rhetoric. As physical demonstration, either in favour or against rhetorical statements could not be adduced controversy and debate were carried out verbally in which polemics, dialectic and logic were the principal means for judging and establishing the truth and falsity of statements, and correspondingly of the value of the statements made by others. Similarly, the method of presentation of ones points of views in a way which could carry conviction, and withstand polemical and dialectical criticism also became as important as the method of criticism.

The Athenian school undertook to prepare students for entering into a public life with the above qualities of orators. Thus the education was carried out primarily in a conversational mode, including debate and discussions on all aspects which were the subjects of discussion at the time. The discussions and debates were conducted for bringing out the weaknesses of different view-points and statements as also for developing viewpoints and propositions which could stand up to criticisms against them.

The terms, concepts, ideas and issues getting entered in these discussions and the method by which evaluations of verbal statements were done, or other verbal statements established as conclusions of the

discussions nearly exhausted all possibilities which could be brought to bear on a search for meaning and truth when only words and not facts were the inputs for analysis.

Thus when at the time of renaissance and afterwards in Europe another spate of intense controversies developed for usurpation of power and status from the catholic church, there was a revival of ideas developed in Greece and a great appreciation for them. These also became the basis for further development of ideas and tools and techniques for carrying conviction with the uses of words alone; the knowledge of these matters became associated with wisdom a quality possession of which distinguished favourably few from many.

The races which settled in Greece also moved to Sicily and Southern Italy where they founded cities that lived by maritime commerce. Large number of city states like Sparta and Athens were formed in all of which forms of government alternated between aristocracy, democracy and tyranny. Rhetoric and oratory thus formed generally in those areas the means by which power and status could be acquired. And the result was that schools and institutions for producing public men were favoured all around; there were also considerable amount of movement among pupils and teachers. These schools generally followed a common curricula and were centres for vigorous discussions on the lines explained above. The subjects for discussion became diversified, this happened partly because the status of wisemen had started being appreciated and valued and partly became wisdom and capacity to speak on many subjects had begun to be associated; but more importantly, because the same words which occurred in the discussions of a particular subject came up also in the discussions of other subjects so that with the use of given set of words a varitable link among different subjects was apparent. Thus issues which today fall under subjects like physics, chemistry, astronomy, history were also discussed and conclusions were reached as if these were also verbal issues and not empirical issues.

Large number of schools were set up in the different Greek settlements. As all these schools were employed in turning out men in search of status and power using rhetoric and oratory as the principal instrument. Each school had to teach not merely a system of ideas but also the drawbacks of the ideas presented in all other schools. As a whole, therefore, there were lots of conflicts and quarrels, and controversies and acrimonies. Over all state of knowledge was utterly confusing for no empirical elements entered into the discussions and controversies, polemics and play on words and verbal propositions being the sole means for settling the disputes.

Macedonian domination put to end the political activities of the Greek city states and took away the basic objective of the Greek schools. These became places for empty disputes and controversies. The utter hollowness of what passed as knowledge and wisdom in the past was also exposed as a result. Thus the schools which dominated the period until the Romans were Cynics, Sceptics, Epicureans and Stoics.

Early Roman Educational System

The Roman republic was formed sometimes at the end of 6th century B.C. The Romans, like the Spartans, followed strictly the traditional tribal pattern in respect of the organisation of the society and of the training of the children. The government of Rome was more nearly an aristocracy than a democracy. The Senate, which for all practical purposes ruled the state, was constituted by a group of elders.

In the course of time the membership of the senate became hereditary, and the members were called patricians who were the descendants of the original elders. Originally, it was imposed that the patricians alone could hold the magistracies and priesthood, interpret the laws, and that no resolution of the popular assembly should be binding unless ratified by the patrician senate. Two leaders were also elected annually, called consuls who summoned and conducted the meetings, held the elections, and led the army.

There were also tribunes, elected by the plebeians for acting as their advocates. Originally there was one tribune for one tribe; in the course of time their number became ten. The tribunes protected the plebeians against summary arrest by patrician officials. The plebeian assembly, which elected the tribune, also discussed policies and provided instructions to the tribune by resolution.

Gradually the plebeian assembly acquired more power and became a basis, for eventual establishment of a blend of aristocracy and democracy, which distinguished the Roman society from the Greek society. Most importantly, the process evolved in a steady manner. The authority of the senate, i.e., the house of politicians and the conservative elements declined steadily, compensated by increases of the power of the plebeian assembly, i.e., the popular elements.

The evolution of Roman educational system followed closely the evolution of the Roman social forms. The victory of Rome in her struggle for supremacy in Europe and Mediterranean coasts had been due largely to the powerful conservative forces by which her institutions

were preserved from decay. Respect for ancestral custom imposed an effective check on the desire for innovation.

Above all, the healthy moral traditions of early Rome were maintained by the discipline of the family, resting on the supreme authority of the father and the powerful influence of the mother, to whom the early training of the child was entrusted. Finally, the institution of censorship backed by the force of public opinion, provided a deterrent against any flagrant deviation from the accepted standard of morals.

The father's authority was supreme in the Roman household, and it was in the home that the early Roman got his first education. The education was more physical and moral than intellectual. Apart from the military exercises and the work of the farm, the boy would learn something of the law and of customary religious observance and codes of behaviour. They were also inured from boyhood to service in camps, so that by being accustomed to obey they might learn to command.

They were also trained by example for the senate; young candidates for office were at first spectators and the father of each youth served as instructor. The home, as the centre of Roman education, persisted during the first two centuries of Roman republic and schools as organised place of learning came to be established only around third or fourth century B.C. But even at the time of Cato (234-149 B.C.) there was a preference for education of the boys at home. Cato himself undertook the education of his son, and opposed the spread of Greek education which was growing in popularity at his time.

Evolution of Roman education system was fully tuned with the evolution of democratic institutions under the Roman republic. Contact between Greece and Rome was also expanding. Greek colonies existed in Sicily and Southern Italy even in the earlier days of Roman republic and provided the Roman's knowledge of the Greek culture; but when Rome extended her sway over the eastern Mediterranean and absorbed the Macedonian empire, the relationships became more intimate. One of its effects was the establishment of structured school system for education of the Roman boys.

In a significant way, even the Greek curricula pattern found its way in the Roman schools. The conservative elements in the Roman republic was, however, influential originally, and they exerted a powerful influence in the organisation of the school system to suit the basic ethos of the Roman life and restrained it from moving into the anarchistic way of the Greek educational system.

The Roman school education began with education in the elementary

schools, called Ludus, which were kept by the Ludi magister. At the elementary schools boys learned to read, write and calculate. At about the age of twelve or thirteen the boys would advance to grammar schools where they went through courses of study of language and literature.

The boys had to practice composition and speech in Greek and Latin. A thorough study of the chosen literary texts was made involving careful reading and repetitions by the pupil, commentary by teachers on grammatical points, on style, history and philosophy, criticism of the text and study of variant readings and critical judgement of the authors work as a whole.

With the development of democratic institutions career in public life opened up. For young men who aspired such a career, the final stage in education was that in rhetoric The Romans made the rhetoric education a professional training and did not allow it drift towards idle debates and controversies and dialectic as in Greece. The best rhetoric education involved studies of subjects like law, history and philosophy; and exercises were set in the composition of speeches on set themes.

In particular, the Romans maintained for a long time steadfastly the values of their traditional system so that the schools set up ideals which were not different from the ideals of training for citizens held earlier when families were the centres of education. The belief also persisted for long that good education is obtainable only at home under the care of the parents ; and most families, which could afford, provided such education to the boys. However, as Roman empire expanded and as the commitment of individuals to armed services increased, responsibility of education began to be shifted to the schools more and more.

By the middle of the second Century B.C. the Romans had overcome the two principal hurdles in their path to global supremacy. The Carthegians in the west and Macedonians in the east were fully subdued and vast area in Europe and Asia came under their control. Three forces were also working simultaneously during this period of Roman ascendancy.

The control of the elders and the Senate was decreasing; with the expansion of the empire and corresponding increase of income of the Romans, arising both from colonial benefit and expansion of trade, a new middle class began consolidating, the power of the plebeians and the new middle class began expanding, and most importantly, with the citizens remaining mostly away on services of Roman Legion, the education of the boys in the traditional value system, which was the unique feature of the earlier Roman system, suffered and in its place the corresponding

Greek educational influence started dominating the minds of the younger boys. For a little more than hundred years various forms of internal dissensions, civil war and revolutions plagued the Roman Society.

The first phase of the civil war was ended, twenty eight years before the birth of Christ, with the victory of Octavian over Antony. The conqueror of Antony was summoned by a general consent to the task of establishing the government which should as far as possible respect the forms and traditions of the republic.

The new system thus assumed the shape of a restoration of the republic under the leadership of princeps. The old constitutional machinery was once again set in motion ; the senate, assembly and the magistrates resumed their functions. Octavian, latter called Augustus, came to power with the support of the Senate, received a formal grant of the imperium from the senate and the people, initially for ten years but latter extended repeatedly and made coextensive in time with his life.

The system of principate survived upto AD 284, but after the death of Marcus Aurelius in AD 180 the respect and regard with which the senate was held by the principates died considerably. In effect, from the period of Augustus to Marcus Aurelius the Roman Empire continued to be tradition bound and the control of Rome on the empire through the senate and citizenship structure—remained. In the course of time, however, the princeps acquired more power, and though principate survived up to AD 184, the authority of the senate had by that time completely decayed. With this decay of the authority of the Senate, the link of Rome an Romans with the empire also became weak, and the latter emperor lost the essential popular support for their rule over the empire.

The Roman School system became fully structured under the principate system. The system was by and large conservative and respected merely the senate and not the other democratic institutions which gained power and caused the revolution in the earlier period. During this period the Grammar Schools, which later became the standard secondary schools all over Europe, took the formal shape, with the government providing support to the institutions.

The grammar schools, as the name indicated, undertook essentially the teaching of language and literature so that the pupils acquired capacities for writing and speaking correctly. In a way, the schools were training institutions, and the subjects taught in the schools, merely provided the contents of writing and speaking. The post secondary education was conducted in the rhetoric schools, but the pattern and the objective were the same.

The principate system survived for about two centuries ; it was

followed by rule by military leaders, acquiring control through civil war. In the process, the link of the emperor with the Roman institutions like senate and the Roman people was broken. The empire ceased to be Roman in the earlier sense, the Roman people as corporate body being separated from the empire.

Education and Catholic Church

The collapse of the Roman Empire was accompanied by the decline of the schools. There was no sudden break, perhaps, but the profound changes in the social and political conditions, associated with the changes in the structure of the Roman Empire, necessarily brought a change in the system of education. Most importantly, the breakdown of the vast administrative machines of the Romans, and the slow withering of the Roman laws, removed the powerful incentive for the acquisition of education. Christianity was the only force, gaining momentum, during the period of decline of the Roman Empire; and it was initially antagonistic to the traditional Roman education because of its belief of the association of Pagan religion with the classical education. The literature which was the principal subject of education in the schools was essentially Pagan literature, extolling the virtues of Pagan Gods and Goddesses and this could not be fit subjects of education for Christian boys.

In the course of time changes occurred in the attitude of the church. The church fathers started creating a new literature with Christian content of theological writing, commentary on scriptures, and letters and other books. Bible was also translated in Latin. The Fathers who created the new literature were learned men, some were thoroughly trained in the old grammar and rhetoric schools.

The materials prepared in the process were turning into contents of education so that the previous objection of the Christians to education as Pagan learning was slowly being removed. With this change, it also started appearing that there were certain rules for interpretation of the scriptures which might with great advantage be taught to earnest students of the world.

Thus St. Augustine favoured a classical mode of training for the clergy. Rhetoric could be used to enforce either truth or falsehood, and therefore, the content of training in grammar and rhetoric should be that of scripture and Christian writing so that the defenders of Christian truth could take their stand armed against falsehood. On the other hand, most monks and priests were often poorly educated and numbled through Latin

services without properly understanding the meaning of the words.

After the destruction of the Roman Empire, as noted earlier, the school system also withered away. Thus keeping regard of the suggestion of the earlier writers like Augustine, the Church started developing schools for its own servants. The structure of the educational system was Roman, the language Latin and the content the Latin Christian literature developed under the auspices of the church. In effect, once more schools were springing up to teach Latin grammar, but for training of priests originally. In the course of time song schools and grammar schools were becoming a normal provision of a cathedral, the former entrusted to a cantor, the latter to a chancellor.

From the beginning there grew up during the middle ages a widely spread system of schools. The mediaeval course of study was founded on the seven liberal arts: The Trivium:—Grammar, Dialectic and Rhetoric; and the Quadrivium: Music, Arithmetic, Geometry and Astronomy. Originally, the church schools were meant for education of their own novices but in western Europe the church assumed the responsibility for teaching others also.

In England Christianity and schools came together. Missionaries came with the Latin service book in one hand and the Latin grammar in the other. They created both the school and the church. The first school was the school in Canterbury. In addition to the novices and other clerical students, the boys at these church based grammar schools were generally the younger sons of nobles and gentry and the sons of merchants and officials in towns who looked for entry into the church as clergy. Occasionally the sons of the serfs did find through the grammar schools the way open to career in the church.

At the end of the eleventh and the beginning of twelfth century the normal state of things in the cathedral was that the bishop had delegated to the dean and chapter the supervision of the schools, and that one of the chief canons was called school master and personally taught the cathedral school himself. He could also allow other schools in the district by issuing licence without which no one was allowed to teach school.

When Constantine adopted Christianity as the State religion, he added a new sanction to the existence of the empire and the position of the emperor. The empire was already one and indivisible in its political aspect; it was welded more firmly, permeated by a common religion and unified by the force of spiritual bond. The empire was now the church, and transcended the bodies of individual emperors and acquired a new life of its own.

In another sense, the spirit of the empire coalesced with the spirit of the church, and this became more an idea and a conception than a fact. In this there was also the crystallization of the gospel of St. Paul that there is one church where of Christ is the head and all are members. The catholic church also actively perpetrated this conception of the empire by making it a part of its own theory of the world.

It also modelled itself in the conception. The Pope borrowed his title pontifex maximus from the emperor; he also made himself gradually the caesar and imperator of the church. The offices and the dioceses of the church were developed parallel to the offices and dioceses of the temporal empire. The whole spirit of orderly hierarchy and regular organisation was also a heritage of the ancient Roman Empire.

For sometime the synthesis of church and empire remained an idea; and the idea was expanded and elaborated in Augustine's City of God. There was also the hint that in the City of God, where only the life could be blissful, the church rules as the agent of God and as per the wishes of God. In a significant way, the Church also conducted its course of activities for reaching such divinely goal. It was also helped in the process by the gradual decline of the authority of Roman empire in the west.

In 475 AD Romulus Augustulus, ruling the western empire laid down his imperial dignity, and the court at Constantinople, the seat of the eastern empire, was informed that there was no longer an emperor of the west. However, again in 554 AD Italy was conquered back by the Roman Emperor Justinian. Under the new dispensation, civil and military powers were separated and the authority over the provincial and municipal government was conferred on the bishop, thus bringing the church into the civil administration for the first time as a part of the emperial order of things.

The situation was consolidated further when Lombards conquered a large part of Italy. This left Rome, Ravenna and the maritime cities under the Roman empire. The necessity for self-defence, the distance from the capital of the empire, and the inability of the empire to render effective assistance due to weakness, compelled the inhabitants of these places to depend totally on their own strength. In Rome, this led to considerable increase in the papal power. The church not only supervised the functions, but also appointed and nominated the public functionaries and judges. Initially the Popes made a common cause with the people against the Lombards; and after the schism also against the eastern empire. In the process the Duchy of Rome was formed with the Church acquiring

sovereign authority. The Pope cáme at the head of a large administrative body and started considering themselves as the real representative of the Roman republic.

The situation could be satisfying but was far removed from the idea of universal order under the church as cherished by the church. Moreover, the republic was not powerful enough to withstand the continuous threats from the Lombards. At one stage, the Pope was forced to appeal to Pippin, King of the Frank, for assistance. The pope consecrated Pippin and named him patricius Romanorum, being the defender of the church. Pippin, on his part, pledged to wrest the exarchate and the Penipolis from the Lombards and give them to Pope which he performed.

Accordingly, in 755 AD the temporal authority of the church received a sanction. Yet the Roman republic, of which the Pope was the authority, continued in precarious state, and survived mostly through support of the Franks. Finally, in 800 AD a permanent solution was sought, such as could stabilize the dream of a city of God and of the universal order under the church, through placing on the head of Charlemagne, the son of Pippin the imperial crown and declaring him as the Roman emperor before an assemblage of Roman and Frankish lords, and clergy and people. Charlemagne started regarding himself as governor under the Emperor of Heaven , made holy wars against pagan kings, conquered them and extended the heavenly Kingdom all over the west, south and north.

For Charlemagne, the title merely added a new sanction to a policy, he had earlier instituted. He had earlier organised his empire on a uniform system of counties; was anxious to suppress heresay and supervise clergy within his borders and to extend Christianity outside it. His subjects regarded him the king of Franks and lived by the Frankish law. The subjects, and also the descendants of Charlemagne held merely that the empire was appendant to the kingship of the Franks. They continued to derive their strength from their tribal heritage and culture.

For the Roman Church, on the other hand, the arrangement brought about a complete metarophosis of its status. The Roman emperors, after assuming dynastic and autocratic stature also, received their imperial status from the Roman population, and continued the belief that such popular recognition was the basic legal sanction for the imperial status.* The church was never accorded a status in this process, which originated in the ancient tribal practice. The Roman emperors treated the church respectfully, but only as a subordinate institution.

The attitude never changed at any stage though document surfaced at a

future time supposed to be a donation by Constantine at the time of his shifting the capital to Constantinople to the Pope of old Rome and all the western territories. The arrangement with the Frankish King, therefore, raised the status of the church at a level, which interpreted from the side of the church, was even higher than the status of the emperor, or at least equal to that.

The church on its part continued its intervention in temporal affairs whenever the opportunities arose, and otherwise also, by developing situations through setting one against others and thereby maintained its status in the summit of affairs. Remarkably, for more than a thousand years, the church succeeded in preserving the myth and also in a modest way the fact of a Roman Empire in Europe.

One the side of the fact, the most important aspect was that the form and structure of the Roman administration were preserved. In particular, the idea of order in the administration of the realm, implicit in the Roman law and bureaucracy became once again the essential basis of administration. In the process, the need for persons with the earlier Roman type of education continued to be felt in these territories.

The tradition of Roman type of education was maintained only in the Church for education of the clergy; and therefore, during this period clergy became associated also with the administration. Ministers, civil servants and advisers and clerks in King's service were mostly drawn from the ranks of the clergy; this was done both for sustaining the myth of the divine character of earthly kingdoms and for conduct of routine administration as except the clergy others did not possess the necessary skill for doing that.

Significantly, therefore, the church schools were the most important instrument in the hand of the catholic church for maintaining and expanding its status. Thus the church was eager both for expanding the educational facilities and also for maintaining rigorous control over the educational process. It enjoined that all churches should provide educational facilities, and that, teaching by a person could be done only after a licence in that regard was obtained from the church.

The demand for education also increased considerably day by day, as education in the schools was the easiest way for entering into the Services of the church and of the king. The control of education by the church ensured that the king's services remained in the hand of the church as an expression of the temporal authority of the church in the concrete sense.

The status and position of the schools and their products increased in consequence. The status and position also increased progressively as

bureaucracy expanded. On the other hand, within the church and the administration hierarchy was established as a part of the bureaucratic structure, with individuals occupying position in different levels. Some persons rose high in the hierarchy and some did not.

Among the characteristics used for distinguishing individuals for occupation of position of different levels, the quantity of education possessed by individuals invariably became important, the relationship being a consequence of the fact that a certain quantity of education was in any case needed for entry into the services. Thus in the course of time, people were distinguishing quantities of education possessed by individuals, in which regard all such things like the school where educated, the teachers who taught, number of years of education, subjects learnt in the school started becoming important parameters.

Printing technology developed in the fifteenth century. Before that, people had to obtain their knowledge directly from the lectures delivered by the teachers. Thus, individuals wanting more education moved from one school to another and devoted sometime to listening lectures from the teachers of their choice.

In effect, there was a considerable extent of movement of students from one school to another. In particular, a pattern of movement was also established in the course of time, with some schools becoming final gravitational centres. The schools of Bee and Charters, of Tours and Rhemis and several other school of Paris, were famous at one time. In the course of time Paris, Bologna, Salermo and Oxford became centres of attraction for students from schools of different countries.

These development of the schools and the educational pattern was also affecting the relationships among the schools, church and the government. Initially the schools were the instruments of the church through which it raised its own status and increased its control over the government, in so far as its own persons occupied the positions of civil authority in the government.

In effect however, the schools were supporting both the church and the government and had an essentially dominating position, which was not apparent so long as the church and the king/emperor worked together peacefully. On the other hand whenever the two fell out, which was not infrequent during the middle ages, the positions of the schools became crucial in the determination of the course of events. These periods also provided the schools opportunities for appreciation of their own positions vis-a-vis the government and the church.

Other types of changes also occurred. Initially the church schools

followed the Roman educational pattern. The church schools were called grammar schools in the lines of the Roman schools; these also followed nearly similar curricula; and the objectives were also similar principally. Grammar, language and literature were taught in both types of schools with a view to train the children reading and writing and also speaking correctly and meaningfully.

Content-wise, there was a slight difference in that the church schools used for literature and language teaching the materials produced by the church or those acceptable by the church. The Roman system provided for higher schools for rhetoric and cratory for training individuals for public services, and efforts were made, some times successfully and sometimes unsuccessfully, to contain these also as sort of training institutes for avoiding the alternative of Greek ways which led to sterile debate, dialectic, controversy, verbosity and scepticism and cynicism. In the middle ages, under the churches, the compulsions of Roman restrictions on higher educational substance, associated with their blend of aristocratic and democratic institutions no longer existed. Thus, as higher educational institutions developed, the educational substance tended more towards the Greek than towards the conservative Roman.

The development passed through all the Greek stages; first, raising significant and meaningful questions; second seeking answer only through verbal analysis, and last, ending in vicious circles, paradoxes, polemics, scepticism and cynicism. The Greeks were initiaters and had no previous history, and therefore their initial questions were philosophical and empirical.

The church school had, however, the scriptures and church writings, and therefore, the initial efforts of the Christian scholastics, in a way, amounted to rationalising the Christian theology, drawing on the analytical techniques developed earlier in Greece. As the Christians had no philosophy, so as to say, such efforts, upto a point, started providing foundations to the Christian theological structure. In this form the effort was acceptable to the church, and the church provided initial supports and encouragement for such scholastic development.

In another observational plane, the scholastic activity started with verbal analysis of verbal texts and thus opened up polemical, dialectical and logical issues, which were raised also in the past in Greece. Thus the study of Greek authors and uses of Greek Analytical methods became popular in the higher educational schools. Writing and discussions also took a definite Greek turn. Teachers started developing their own thesis; controverted each other only on verbal grounds; mutual respects were

lost; the respect for the authority of the church also suffered.

These development of the schools and the ideas therein was further associated with the growth of universities in the middle ages. Already, as noted earlier, some schools were growing into centres for advanced studies, and attracted pupil's from different countries. The growth of scholasticism and the elevation of teachers of eminence due to their dialectical, logical and rhetorical abilities and also due to their individualities, all of which resulted from the turn which higher education took strengthened the process of the growth of universities.

Origin of the University

The word—University—originates from the mediaeval Latin term *Universitas* which denoted any community or corporation. The more ancient and customary designation of bodies devoted to learning in mediaeval times was *studium*, and subsequently *studium generale*. These organised bodies, in the first stage of their development were formed on the basis of the permissions accorded by the Chancellors of Cathedrals to open other schools than the Cathedral schools in the neighbourhood of the churches. At a subsequent stage of the development it was enjoined that without a licence from the Pope, Emperor or King no *Studium Generale* could be formed possessing the right to confer degrees which originally meant licence to teach.

The University of Paris, which is one of the oldest European Universities, grew originally out of some schools attached to a Cathedral, presided over by a Chancellor some times during the 12th Century. The teachers taught in the schools by virtue of the licence conferred by the Chancellor of the Cathedral. For a long time the teachers lived in separate houses, and slowly they combined themselves into a society, and special buildings were constructed for their class work. But it was in the grant of licence by the Chancellor that the University grew up. In this licence contained the whole significance of the master of arts degree for what was technically known as admission to the degree was really nothing more or less than receiving the Chancellor's permission to "incept," and by inception was implied the masters formal entrance upon, and commencement of, the functions of duly licenced teacher and his recognition as such by his brethren in the profession. The previous stage of the academic career of a master, that of a bachelordom, was only one of apprenticeship for the membership.

This development of the institution of university was a culmination of

the trend set in the middle ages. By the end of the 6th Century the earlier secular schools of the Roman empire, built on the Greek Academy structure, had been swept away. Their place was taken by the Cathedral and monastic schools. These schools taught only what was supposed to be necessary for the education of the priests and monks. By the 12th Century three schools attained their highest degree of influence and reputation. The studia in effect developed as a means for extending the facilities for such education. The system of licensing ensured that the core of the educational programme in these institutions did not deviate from the pattern of education provided at the Cathedral Schools.

The universities at the earlier stages continued to be places of education of the clergy. The secular part of its education mostly confined to the study of logic, but it also arose out of the belief that intelligent appreciation of spiritual truth depended upon correct use of prescribed methods of argument. Dialectic was looked upon as "science of sciences" in so far as it afforded means for studying the views of the fathers and all great doctors of the Church upon the chief and difficult points in the Christian belief. The study of logic also provided means for seizing upon their views as the great storehouse of major premises for drawing varieties of conclusions on matters touching on religion and common life.

The ancient universities have all similar histories and structure. The university of Oxford in England developed out of an edict of Henry II, during the quarrel with Becket, recalling all clerks holding benefices in England to cross the channel. Paris was at that time the great place for higher education for English Students. The name of Oxford as a studium and a studium generale began to be heard immediately after that. The University of Cambridge, although it came into existence somewhat later than Oxford, also developed in the same century (12/13th).

There was a certain amount of educational work carried on by the Canons of the Church of St. Giles which gradually developed into instructions belonging to a regular studium. Sometimes in the beginning of 12th century these canons took up their residence in the new priory of Barnwell and their work of instruction acquired additional importance. There is evidence that at the beginning of 13th century the Cambridge was already established as a university with a Chancellor at the head.

In a significant way, the universities and the earlier Cathedral schools performed most valuable services for the catholic church, out of which these had originated. It set apart the body of Clergyman as the learned man of the societies with knowledge of the scripture as well as capacities

for interpreting the behaviour of the social and natural order of things. The education and the knowledge derived therefrom also distinguished the clergy from others in the society and provided a basis for the supremacy of the church as a social institution over the other institutions.

In another way, the association with the church provided significance to the types of knowledge acquired in the schools and colleges, and made the possession of education and knowledge a respectable quality in the society, as valuable as, or even more valuable than, all other qualities human beings in the society were capable of acquiring. Thus, both supported each other, and together formed the foundation for the institution of Catholic Church in the European Societies. The types of education provided in the ancient schools, colleges and universities, with the rigid control of the Church and with the system of award of degrees and corresponding licence for teaching also ensured complete commitment of the scholars, who were mostly church functionaries, to the religion of Christianity and to the institution of Catholic Church.

The organisational association of the universities with the church also afforded the church direct control of the structure of education as also of the views and utterances of the academic community. Galilio was prevented from uttering his views about the copernican findings though he was convinced from his study of astronomy about its validity.

Thus the universities and the system of education, developed in the middle ages became the most important instrument of the Catholic Church for establishing its control over the European societies. The education, so to say, did not provide special capabilities to the individuals for conduct of any occupational or professional functions; but on the other hand, it developed a degree of respectability for the individuals who acquired it such as which could not be obtained in any other way. The respectability associated with university learning was due to the church, but the church benefited most from the respectability of the individuals associated with the church. In a way, therefore, the church managed to raise itself by its boatstrap.

The Papal victory of the 11th century, the development of law, theology and ecclesiastical order, made the Holy See the Centre of a judicial and administrative system, and a basis of all governments. It became the Final Court of appeal in international disputes. The authority of the Pope was also popular and moral.

In another sense the respectability so induced acted like a double edged sword. The Catholic Church was confronted with the most vigorous challenge at a time when the university system was fully

consolidated, with a large number of centres and a big academic community of masters and professors. The 13th and 14th centuries in Europe were period of rational, cultural and social revolution. Commercial rivalries among the nations had significantly crystallized leading to national activities of all sorts.

Vernaculars of Italy, France, Spain, Germany and England also matured by that time; the legal and political systems of those countries were also fully organised. In Italy the cities of Venice, Florence and Milan were independent powers. The Holy See fully reflected this revolution in the European scene, and became the Centre of Italian politics, and international diplomacy, subject to international intrigue. In the process it also lost the position it occupied in the middle ages.

The church itself also did not escape from the effects of disintegrating forces which were operating all around. A great schism developed within the church which lasted for many years. One Pope came up with the support of France (Avignon Pope) while the enemies of France recognised the Roman Pope. Each Pope chose cardinals from among his own partisans, and when either died his cardinals quickly elected another. The University of Paris developed a theory giving powers of initiative for healing the schism to a General Council. A council was summoned which was met at Pisa (1409 AD). The council declared both the Popes deposed for heresy and schism and elected a third who died promptly. His Cardinals elected another so that there were then three Popes.

The general disorder also touched the world of learning and the learned men—both inside the universities and outside. Differences touching on philosophical issues started in a scholastic framework in the disputations between the Dominicans and the Franciscans. The church in the early 13th century was threatened most vigorously by the rise of heretical sects. From this it was saved, very largely, by the movement started by St. Dominic and St. Francis who were orthodox Christians. The Pope gave recognition to both the orders.

Although both orders—Dominican and Franciscan—were orthodox, they developed strong differences in their philosophic approaches in the academic sphere which, in a way, also reflected the keen rivalry between the two orders. From the side of Dominicans the most significant contribution was made by St. Thomas Aquinas. He was for six years at Federich, it's university of Napees. He was also at Paris and Cologne. From the side of Franciscan schoolmen Roger Becon, Dune Scotus and Willian of Occum were prominent.

University and Renaissance and Reformation

In the course of time, as political environment in Europe became more anarchic, the discussions in the university and writings by the academic persons also became less and less regardful of the authority of church; and many things which would never have been expressed earlier began to be expressed freely. In this respect, significantly, the academic persons found the most support in the authority and respectability which the church itself had conferred on them.

Both renaissance and reformation, which destroyed the absolute Catholic Church of the middle ages, were instances of a crystallical application of a force, which the church created for its benefit, going against the creator like Frankenstein. The mediaeval universities were conservative, and strictly conforming to the objectives of the Catholic Church. But by 13th and 14th century, a considerable amount of mental activity arising out of the controversies between the Dominicans and the Franciscans, or between the realists and the nominalists (all of which led, one way or the other, to issues connected with the supremacy of the church in the world) were started. At almost all universities the academic community was divided and engaged in struggle. In Italy the differences were not even classifiable. For each subject of importance there were always two, and some times three rival chairs. When even this did not suffice for the variety of opinions being developed in the universities, a new subject of rhetoric was started in the universities.

The Italian renaissance, particularly the attendant fury and emotion, was the work of Italian professors. The professorial body in the Italian universities attained an almost unrivalled reputation throughout Europe. Students and professors from all countries were drawn in these universities. At that period no lecture room was more crowded than those in which the subject of rhetoric was discussed. The subject of the lecture was a mass of Greek and Roman erudition, including history and metaphysics, law and science, civic institutions and the art of war, mythology and magistracies, material system and oratory, agriculture and astronomy, domestic manners and religious rites, grammar and philology, biology and numismatics. The lack of printed books in this period, and the comparative rarity of Greek erudition among the students, combined with the intense enthusiasm aroused for the newer ideas, gave special value to the personal techniques of these professors.

By this time, Italy's political disintegration was also nearly complete. Many cities had set up independent governments, while others were also

looking for opportunities for doing so. In a significant way, with all sorts of ideas floating in the universities, support for each intension was also obtainable in these ideas. Each large city was also establishing its own public study, academy or university and attracted the appropriate professors. The professors also journeyed from city to city, attracted by promises of higher pay, and allured by ever-growing laurels of popular fame.

The professors of rhetoric became, so to say, a class of highest dignitries, they were found in the chanceries of republics, in the papal curia, in the Council chambers of princes, at the headquarters of condottieri, wherever business had to be transacted, speeches to be made and work secretaries to be performed. Furthermore, they undertook the charge of private education, of opening schools which displaced mediaeval system of instruction and regard for order and organisation, and taking engagement as tutors in the families of despots, nobleman and wealthy merchants. In significant ways, the whole movement arose out of the general disorders in Europe and particularly that in Italy, and in its own way fanned the flame and contributed to the ultimate disintegration of the Italian organisation.

The seed of reformation was planted in German universities. Martin Luther, an Augustinian Friar and university Professor of Wittenburg initiated the whole movement leading to the reformation and the final demolition of the mediaeval structure, built around the Pope and the Holy Roman Empire. The political complications were great in Germany also in the 15th and 16th centuries. The empire contained more than 300 separate societies which often rendered little more than nominal obedience to the emperor. It was the patronage of few local princes which sheltered his movement in its first stage.

But most importantly, he received the support of younger university teachers. His works were made easier by the previous development of the printing press, and he used this facility for directly appealing the masses. His doctrine was spreading widely. By 1523, the number of books printed reached a figure of 498; out of which 180 were by Luther himself. Most of the great cities were becoming Lutheran and the doctrine spread in Luther's own religious order. Professors of his own university started teaching, lecturing and writing on almost all the traditional ceremonies.

While the renaissance in Italy was initiated by the prevalent disintegrative political forces and caught on ultimately as a forest fire, the reformation movement of Luther initiated the political disintegrative forces in Germany. But at all stages, the main focus of the movement,

remained on Luther; sometimes he was the aggressive element, at other he was defending. Thus, when the movement started turning anarchistic as in Italy with the Azaican rebellion or the peasant's war, Luther personally stood up against the trend so that the princes who were his supporters in his personal battle would not lose control over their dominion. In this search for support he and his order even found priestly justification for bigamy by a prince.

The movement in the process took a different turn. Luther had began his movement by insisting on responsibility to God alone, and never to the Church, but with the princes taking sides one of the objectives became subordination of Church to state. Reformation ultimately achieved this end.

Reformation in England also had a political beginning. King wanted to divorce his queen and marry another which the Catholic Church could not ordinarily permit. The Pope evaded all definite decisions, shifting in response to shifting political situation for three years. The king finally appealed to the universities, and apart from Oxford and Cambridge, eight of the greatest in Europe decided in his favour (Paris, Orleans, Bourgis, Toulouse, Bologner, Ferrara, Pavia and Padha) There are evidences and suggestions that the views were obtained by royal pressure as also by bribing, but they provided the king the necessary support for embarking on his predetermined course and for subordinating ultimately the church to the state.

Protestantism and Liberal Education

The victory of the king over the Catholic church was complete, but the period of supremacy of the kings of England was also short lived. The absolute monarchy of the middle ages in most non-German states was in part due to the status of the kingship defined by the church, as the head of the secular aspects of Christian Community. The absolute authority was thus conditional.

After the severance of the tie between the king and Catholic Church, the kings in England tried to make their position absolute for which vigorous efforts were made to bring the church under the control of the king. The Act of Supremacy confirmed the king's headship of the church and another act made it treason to attack the new title even in speech. Sir Thomas More and Bishop Fisher were executed.

Oxford and Cambridge universities were purged of catholics; and scholastic and canon law studies were prevented. The protestants,

however, had not supported the king in his fight against the Catholic Church for losing whatever authority and respect the religious establishments possessed under the Catholic system. Thus reactions developed soon. The puritans would not admit any authority in religion that was not based on scripture, and rebelled. There were also dissension among the clergy.

The bishops derived their support from the king and in return supported the king's absolution. Thus the lower order clergy went also against the higher order. The clergy in the universities in any case, being at the forefront of the renaissance and the reformation movement was hostile to the authority of church which in the past drew its strength from the universities but did not share its privileges with them. By this time the Catholics were purged from the universities so that universities were homogenous, and protestant dominated, and not at all inclined to the authority of the church. Thus a multi-cornered fight emerged in England.

The protestants ultimately gained victory in this context. The establishment of the protestants which gained control was also the universities, and not the church. The kings lost totally, and rule was also framed that kings must be protestant. The respect, strength and the status, which the church and also the king in his fight against the church accorded them in the past, and which they used vigorously against the establishments of the church itself sometime back, were now used in their own favour. During the period of the holocaust which raged in Europe since renaissance thé status of the universities also improved considerably, for all sides in the multi- cornered contest were trying to enlist the support of the wiseman from the universities.

The structure and pattern of the universities and degree system, i.e., of the system passing through which men emerged as learned and wisemen, and obtained the privilege of being heard attentively and with devotion, were preserved intact, so that no diminution in the halo associated with the establishments could occur. The core of the education and the content of knowledge, acquisition of which made individuals learned and wise, however, could not be the same as that in the previous generation, consisting of ideas supporting Roman Catholic Church only. Protestants beginning with Luther had argued that General Councils might err; that determination of truth was not social but an individual enterprise.

Such slogans were dangerous in a way because possibilities of disrespect for all claims of knowledge and wisdom and for protestant ideology also were contained in these. For the protestants the problem was serious and liberalism and liberal educational programme were the

answers. These defined and determined the core of education and content of knowledge, acquisition of which could again distinguish learned and wise of the new generation from others.

In a rational framework the basis of wisdom necessarily lay on the belief of an ordered universal system which was thus deterministic. Some issues are contingent in this belief—who made the universe ordered when it could also be unordered; who can know the nature of the order and how. In Orthodox Christian System the God is credited to have been both the creator of the universe and the architect for the order. He alone knows the nature of the order. Jesus Christ, being the son of God also had knowledge of the nature of the order, and took the character of mortal being for providing guidance to the human beings as to the correct path to be taken for reaching the destiny, which God ordained for them in the established order of things.

With the passing away of the Son of God, this mantle for guiding the generations of human beings fell on the church and the bishops who alone possessed the knowledge of the righteous path and path of salvation. In particular, the mysteries of the universe cannot be resolved; and knowledge cannot be obtained; it is only revealed by the grace of God. But with faith and guidance of the church men can travel through the right path and avoid damnation. Thus, in this process the great virtue and strength of knowlede were established, being the quality of God, and the benefit of knowledge was reserved for the men of Catholic Church.

In the liberal theology and ideology universe as an ordered system was stipulated so that knowledge about its nature could become the content of wisdom and also become the basis for distinguishing wise men from others. It was also claimed that the nature of the order was knowable. This was necessary both for scoring a point over the catholic who had said that the knowledge was unknowable and also for establishing the insignificant character of Catholic wisdom.

This changed the dimension of knowledge altogether. It was no longer necessary that the content of knowledge should be the scripture or the Holy Books, nor was it necessary that the expression of wisdom should be interpretations of the Books or sayings of great men. Assumption of an ordered universe and the claim of knowability of the structure of the order, i.e., the laws of nature, were, in a way, consistent with possibilities of explanation of individual events on the basis of statements of specific laws of nature. Acceptance of such explanations could, therefore, be used for arguing about the validity of the original statement of the law of nature. Such statements could also be then held out as laws of nature, being the cause for determining individual events.

In particular, so far as the issue against the Orthodox Catholic System was concerned, it was only necessary to hold out evidences of the relationships between a particular statement of law of nature and given natural events and to stand by the sufficient character of the relationship. The crucial aspect in this matter was not the statement of the laws of nature, nor the relationships between the laws of nature and the particular events but the emphasis with which the relationships could be held as sufficient for passing on any statement as a correct law of nature.

In a way, for establishing the claims of knowability of the order of the universe, and correspondingly for establishing superiority of the new system over the orthodox catholic system it only needed enunciation of a set of rules for evaluating statements which could be pressed as a law of nature and for certifying some statements using such rules as true laws of nature.

Wise and learned men of the new system required, therefore, knowledge of these rules of evaluation which could pass statements as laws of nature. In one sense, this also turned into interpretation, but not of the scripture but of empirical statements.

The core of education at the universities under the new system, therefore, developed primarily into study of these rules of evaluation and methodologies of interpretation. Men possessing such knowledge were to be considered as educated persons; and all statements in regard to empirical propositions became the expressions of wisdom. Equally meaningful and worthwhile also became the studies which ultimately developed beliefs and faith in the ordered universe and in the possibilities of acquiring knowledge about the structure of the order.

Belief in the men's capacity to know the structure of the order of the universe, which was considered equivalent to the capacity to acquire wisdom, was first induced by insisting on the great intellectual qualities and the abilities to think, which human beings as individuals possess in contrast to the instinctive and adjusting qualities of other animals. Thus it was argued at one stage that the reasoning faculties of men should be enough to build up the knowledge of the structure of order of the universe. Descartes, a French philosopher and mathematician, originated the idea. He had personal grounds for making such claims because he developed the analytical geometry which could bring out the same conclusions through analytical methods that the earlier Greek Geometers had brought out by what they believed as experimental methods.

Descartes was a Catholic himself and had certainly noted that his ideas were not opposed to the views of the Catholic Church. The ability of the

reason to read the structure of the universal order could not be denied on his own evidence of analytical geometry; but it was also understood that if wisdom had to be of a sort possessed by Descartes then very few could be expected to possess wisdom.

Such ideas bring back the conception of *chosen individuals* and make it difficult for others to present themselves as wise men. Thus though human beings were elavated, bearing capacities for reading the order set up by the God, the Cartesian ideas did not make wisdom an easy thing for acquiring by all, particularly by those who had aspiration but not capacities of the cartesian sort.

Thus opposed to Cartesian rationalism there developed in England, which was first to establish a complex of protestant church and state, ideas of empiricism as the basis of knowledge. Locke was the founder of this doctrine; he held that all knowledge is derived from experience. The ideas, he held were derived from the sources, (a) sensation, and (b) perception of the operation of our mind, which might be called internal sense. Since individuals thought only by means of ideas, and since all ideas come from experience, it also followed that no human knowledge could antedate experience.

In a way, these ideas were significantly different from the prevalent ideas of the time. It was generally held at that time, under the influence of Plato and also of Descartes and Leibnitz that mind was supposed to know all sorts of things a priori; that, the most valuable knowledge was not derived from experience.

This part of the liberal idea has been called empiricism. So to say, it held out that knowledge could be acquired by all persons, experience being the only source for the acquisition. This took away the privileges of the Catholic Clergy, which alone could, in the past, be considered wise men, having possession of what went as knowledge during those days. In the post reformation days the core of knowledge changed—from divine laws to natural laws—but Cartesian rationalism, notwithstanding the change of the core of knowledge, continued to make the acquisition of knowledge a matter of privilege. The empiricism removed even this handicap and allowed the acquisition by others also.

Empiricism thus provided the essential foundation for the new system dominated by the protestants. It established the basis of knowledge as the nature in place of the scripture and Holy Books; took away the privilege of the Catholic Clergy to be considered as the only wise men; defined the core of knowledge as explanation of natural events in place of the scripture and interpretation of the Books and revelations of the Holy

persons; and most importantly, provided a humanistic touch by making wisdom, accessible to all on principle rather than to selected few.

The liberal educational programme under the universities did not, however, necessarily require study and discovery of natural laws. The new crop of educated persons merely required to uphold the belief in empiricism. Thus the education of science which could be expected to lead to discovery of natural laws was not required as a necessary part of the liberal educational programme as much as the education of scientific method and of the theory of knowledge. At the most, these persons, required the evidence of valid natural laws propounded by scientists so that the claim that the order of the universe as knowledge could be substantiated.

In particular, liberal educational programme largely covered studies of law, politics, economics, history and logic and theory of knowledge. Study of mathematics was also highlighted because in it one could see the essentials of a unified, structured and ordered system which were believed to lie beneath the perceptable universe and which provided the basic justification for distinguishing the post-reformation system of knowledge from the catholic system.

The new system depended on two assumptions; the universe is totally ordered and the order is discoverable through experience. For the protagonists of the new system, which the universities after the reformation were expected to produce, the knowledge of the order was not necessary, nor the protagonists required to discover the order themselves. But on the other hand, unless evidences of statements of laws of nature could be produced belief in the new system could not be sustained for ever. Thus study of science of such sort which could produce what was called laws of nature was also favoured under the liberal educational programme.

What passed as knowledge under the new system was statement of universal/natural laws and of invariable relations which on the one hand provided explanations for given events and on the other predicted occurrence of new events. Newton provided, in his law of universal gravitation, the first evidence of such a statement which, as a matter of fact, became the major cause for the *victory of the English liberal ideology*[1] over not only the Catholic system but also the continental ideas. Sixty years before the publication of the law of gravitation by Newton, Kepler had enunciated his three laws of planetary motion. These were not based on theory of any kind, but were intended to sum up

1. Russel : A History of Western Philosophy, p. 666.

the facts of observation. Newton hypothesized at the outset the operation of gravitational force and showed that, given the character of its form, the motion of the planetary bodies as obtained in direct observation was deducible from his law.

According to the claims of empiricism such law as developed by Newton should be known through experience and empirical investigation. In the particular case, therefore, the data available during his time which Kepler used should have been capable of yielding the law of gravitation. On the other hand, it was also appreciated that generalization from given facts could not be expected to yield valid natural law, true independently of space and time, since subsequent events might turn out inconsistent with an inductive generalization. Such situations would not only invalidate the law but also raise questions about the initial stipulation of the liberal ideology that natural laws are knowable.

Although, the Newton's law of gravitation could be obtained from the orbits of planetary motion developed by Kepler by methods of calculus which Newton had developed and known, Newton himself never indicated that the law was derived thus [2] Thus, with the liberal philosophers, Newton ideas turned out as statement of a natural law whose validity lay in the possibility of deriving Kepler three laws of planetary motion and of determining the actual motion of the planets.

In effect, from the beginning a duplicity was associated with liberal ideology. Experience is always concerned with individual events and provides at the most data which can be acquired by any one. Neither accumulation of such data, nor their presentation could, therefore be expected to distinguish individuals by levels of wisdom. Generalization can be made on the basis of the data, but such generalization will not have explanatory qualities, nor can be held with certainty. Thus those cannot be identified with knowledge which the liberals claimed experience can accord. On the other hand, in the fight against the scholastic system of the Catholics, the liberal idea of the possibility of the knowledge of natural laws, which are capable of explaining and predicting events, and are obtainable from experience alone, was essential and crucial for victory.

The anachrony of the liberal position was suppressed from the beginning by raising all sorts of issues about sensation, perception, ideas, universal and common names, meaning of words and sentences and propositions and statements, truth and falsehood and by engaging in

2. Max Both : Natural philosophy of Cause and Chance; p. 129, Dove publication.

involved and fruitless discussions on these matters. Locke discussed all these matters and was thoroughly inconsistent, Berkeley was rigorously empiricist but took away the matter from material things and possibilities of enunciation of natural laws, *the existence of things being in dispute.* Hume ended as through sceptic, and inconsistent generally.[3]

In the practical sphere the situation got resolved through all sorts of twists in the conception of empiricism. In the final form, empiricism only required the empirical verification of scientific propositions, or universal/ natural laws and theories before these being admitted as knowledge, and surrendered the earlier enthusiasm regarding the experience as being the only source for deriving scientific propositions. The apologists, however, did not admit that theories or hypothesis framed without the basis of experience could be stated as a priori, and they also distinguished, with this belief, the above position from the rationalist position which admitted a priori proposition of science[4] and thereby consoled themselves that the position could still be called empiricism, and be linked with liberal ideology, and be used against Catholic scholasticism. A long course of discussion also started about the concepts of verification, confirmation, verifiability etc. which suppressed in consequence the essential issues involved in the new conception of empiricism.

These developments also determined the pattern of science education under the liberal programme in the universities. The education aimed at developing faculties for producing scientific hypothesis and theories, which alone were considered as knowledge. It also aimed at developing methodologies for verification of the hypothesis. In one plane, therefore, emphasis was laid on training in mathematics under science education programme. Such a training was essential in that it was, with the exception of the possible benefit from intuition, the only means for developing hypothesis of a general proposition from scanty evidence without giving impression of an empirical generalization, such as the functions obtainable by integration of differential equations. It also helped in developing and deriving additional propositions from a theory which could be verified empirically.

In the other plane, the education covered laboratory work of such sorts which could afford verification of the scientific propositions. In

3. Russel : History of Western Philosophy, Chapters on Locke, Berkeley and Hume.

4. The above is the position taken by the logical positivists. A.J. Ayer · Language, Truth and Logic, particularly the preface to first edition and chapter on solutions of outstanding philosophical disputes.

particular, the verifiable propositions were the consequences derived from a theory and these needed measurements of various sorts for their verifications. Thus, very special type of laboratory work, involving use of varieties of measuring instruments, developed under the liberal science education programme.

Although credit was taken of the practical benefits in the application of scientific principles to productive activities, and although these benefits were presented as the distinguishing feature of the knowledge popularised under the liberal philosophy, education of the aspect of application of scientific principles was not emphasised in the universities. Such knowledge were not considered wisdom, but only provided the benefit afforded by wisdom. This justified separation of such studies from the liberal educational courses given in the universities, which was necessary otherwise also so that the status of the wisemen and men of learning could be preserved and distinguished from others.

In effect, the university system under the liberal programme, was geared up to perform the same function which the universities under the Catholics were doing

The programme of education was different, but the difference was wholly related to the changed emphasis under the new social organisation. The graduates of the new system were also expected to perform the function of apologists for the new system. The education in the universities thus emphasised more than anything else the study of what were called arts. In the English Universities enrolment in the art subjects as percentage of total enrolment was much more than the enrolment in science and other subjects. The situation was the same even in the middle of 20th century.

Although, the study of arts could be generally distinguished from the study of science on the basis of the expected emphasis on the development of skill and capabilities in specific directions, the education of arts in the English Universities also began to follow the method adopted for science education. Here also attempts began to be made to develop pure knowledge which would explain events and predict events. The modified empiricisim started dominating the education of arts subjects also; and in the course of time education in the universities became wholly what came to be understood as scientific. It generalised the liberal approaches to the issues of knowledge, and provided, thereby further support to liberal ideology.

CHAPTER V

ORIGIN OF THE UNIVERSITY SYSTEM IN INDIA

Formal educational system on a university structures was initiated in 1857, when the then Presidency universities of Calcutta, Bombay and Madras were set up. These three universities were set up on the basis of a despatch of the Court of Directors of the East India Company, made in 1859. Sir Charles Wood was the President of the Board of Control of the Company at that time therefore the despatch came to be called as the Wood's despatch.

Among other things, which included the setting up of Educational Departments in each province, the despatch held out that the time had arrived for the establishment of universities in India, which might encourage a regular and liberal course of education by conferring academical degrees as evidence of attainments in the different branches of literature, art, and science and by adding marks of honour for those who might desire to compete for honorary distinction. Thus recommendation was made for establishment of universities at Calcutta and Bombay (and even at Madras or any other part of India where sufficient number of institutions existed from which properly qualified candidates for degrees could be supplied), on the model of the London University. The receipt of the despatch was soon followed by considerable educational activities all over India. The three universities were created on the model of the London University for examining students and granting degrees in Arts, Medicine and Civil Engineering. A system of grant-in-aid to schools and colleges under private management was also introduced in the provinces.

The Early Approach : Spreading Religion for Education of Indian

Setting up of the universities and the inauguration of formal educational

system were, however, a culmination of a process, started much earlier in 1813, which also in a way, had roots going further back. In 1792-93, Wilberforce, a well-known philanthropist introduced a resolution in the Parliament, when the renewal of the charter of the East India Company came up before it, in which adoption of measures such as might tend to advancement in useful knowledge and to the religious and moral improvement of the Indian nations was suggested. He also suggested that the Court of Directors of the Company should be empowered and commissioned to nominate and send out from time to time a sufficient number of skilled and suitable persons who should attain the aforesaid object by serving as school masters, missionaries, or otherwise. These resolutions were not, however, adopted.

Wilberforce's resolution was prompted by Charles Grant, who was then one of the Directors of the Company. In 1779 Grant himself submitted his observations on the state of society with respect to morals among the Asiatic subjects of Great Britain and on the means of improving it. In this he described the low moral conditions of the people of the country and exerted the Company to endeavour to ameliorate it by communication of Christianity to the natives and by arranging to impart to them a knowledge of the English language as a key which would open to them a world of new ideas. He added that the true cure of darkness was the introduction of light; that the Hindus erred because they were ignorant, and that, the communication of Christian light and knowledge would prove the best remedy for their disorders. He further added that the communication should be made through the English language.

The Company was not initially averse to spreading Christianity in India, and even believed that spreading the religion would consolidate their trading and other interests. Thus soon after factories were set up in Surat and Masulipatam in the first quarter of the Seventeenth Century, the Company began to send Chaplain to India for that purpose. In 1678, when the charter of the Company was renewed, a clause was also inserted enjoining the Company to maintain a minister in every garrison and superior factory. In those days the Company was preoccupied with extending their trade and territory in which regard conversion to Christianity could be expected to contribute significantly. By the end of eighteenth century, however, situation changed drastically; the empire was formed; and the immediate issue became administration and government in which regard many other options, than merely conversion, were open. Moreover, from the side of Hindus and Mohamadans both, resistance had developed against the missionary activities which the

company was unwilling to crystallize further through direct actions. In particular, since the assumption of Dewanee of Bengal in 1765 the Company had, for all practical purposes, changed over from trading to ruling functions and realised, in its new role, the advisability of abstaining from doing anything in support of missionary attempts at proselitisation that was calculated to arouse suspicion about its motives among the people and provoke their opposition to its rule. Thus the Company did not proceed with the proposals of Wilberforce and Grant in the form in which these were tendered.

In 1813 the Company's charter again come up for renewal, and at that stage Wilberforce and Grant, who were then members of the parliament, got another clause inserted in the charter, which was in spirit the same, only formally different and consistent with the new attitude of the company and the British Government towards the natives of India. It was suggested that such measures should be adopted as might tend to the introduction among the native inhabitants of the British Dominion of useful knowledge and of religious and moral improvement provided that the authority of the local governments respecting the intercourse of Europeans with the interior of the country be preserved, and the principles of the British Government, on which the natives of India had relied for the free exercise of their religion, be inviolably maintained. It also enjoined that depending upon the revenue and profits and after defraying the expenses of military, civil and commercial establishments and of other items, a sum of not less than one lakh of rupees each year should be set apart and applied to the revival and improvement of literature and for introduction and promotion of knowledge of science among the inhabitants of the British territories in India.

This clause became the basis of the future involvement of the British administration in the affairs of public education in India. The aim of spread of education of science among the Indian natives continued alongwith the spread of Christian religion, but by then it was realized, as explicitly stated by Wilberforce during the debate on the clause, that more gains could be expected from education and instruction, from diffusion of knowledge, from progress of science and from all these combined with circulation of scriptures in the native languages than from the direct labour of missionaries properly so called. The Court Directors of the Company, after the renewal of the charter, wrote to the Government of Bengal, that keeping regard of the company's desire to encourage the extension of the principles of Christian religion in India an addition to clerical establishment maintained by the Company should be made.

Reversion of Emphasis: Spread of English Education for Religious Conversion

In 1815 the Bombay Education Society was formed with Sir Evan Hepean, Governor of Bombay, as President. The society admitted Indian and European children to its schools and taught reading, writing, arithmetic, and such other branches of education as appeared necessary and particularly the principles of protestant religion.

The society opened many English Schools in and around Bombay, and admitted many Indians for Education in English language. Very soon it also confirmed the idea of Wilberforce that English education was more effective in transmitting Christian values than the missionary efforts. It was also noticed that it had greater capacity to obtain native support for the British administration than what mere religious conversion had achieved in the past. The thinking was admirably and candidly summed up in the minute prepared by Elphinstone. In the minute he objected strongly to the mixture of religion with the plan of education of the society and explicitly expressed his feeling that the conversion of the natives must infallibly follow from the diffusion of knowledge among them. He added that fortunately for the British the natives were not aware of the connection, and also held that the only effect of introducing Christianity overtly in the schools would be to sound the alarm and warn the Brahmins of the approaching danger.

Education as Instrument for Manpower Development

By the first quarter of 19th century the Company had nearly completed its territorial conquest and had started settling down to developing mechanism for a long period of imperial administration in India. Three models in this regard were available. In the first case major administrative responsibilities could be borne by the English men, and for mellowing the impact of a foreign rule, and for obtaining tacit consent of the population in the rule, population could be converted to Christian religion through the missionary activities. So long as the Company had not settled down to complete civil administration, and therefore, had a small liability the Company conducted its affairs on the above basis. However, problems started emerging as responsibilities increased; there were difficulties of getting persons of right quality from England in sufficient number; and more importantly, the conversion programme could not touch the leading social groups and castes so that popular

support for the administration was not forthcoming. Thus by the end of 18th century the policy makers in England were convinced that this model could not be consistent with the long term design for the empire. The other two models were based on the experience of English education in Bombay and Bengal.

In general, it was noted as indicated earlier that Indians exposed to English education invariably picked up the European and Christian values, and that though religious conversion of the upper strata of population was not possible through the missionary activities, a moral and psychological conversion of this class with similar, if not more effectiveness, was possible through provision of English education. It was also understood that with this orientation, this class could also be associated with the administration and given positions of trust and responsibility and be used as an instrument of the British administrative organ, for which in view of the increasing involvement in civil administration and of the difficulty of getting sufficient number of persons from England, the requirement was steadily rising. The Court of Directors of the East India Company was also explicit in this matter. In 1827, it mentioned in a despatch, in review of the proceedings of the Bengal Committee of Public Instruction, that as it might be expected that the intended course of education would not only produce a higher degree of intellectual fitness but also contribute to raise the moral character of those who partake of its advantage and supply civil servants to whom offices of trust could be committed, the first object of education should to prepare a body of individuals for public services for which the demand is daily increasing. In the same year the Court of Directors made a similar communication of their policy to the Government of Bombay. In this communication the Court also made clear that it intended to draw the higher classes into positions of trust, and that the education should be programmed for such. Similar communication was also sent to the Government of Madras. The remaining two models mentioned above were based on this idea that a properly oriented group of upper class Indians could be used as an instrument of the British Government, but differed in their methodologies for fashioning the instrument.

In Bombay under the guidance of Elphinstone a two tier educational system was established from the beginning. The Bombay Education Society introduced in the schools under its control wholly English educational programme. The society, however, did not plan to extend the facilities of such education to all natives. Instead, programme was developed for provision of general educational facilities in the local

languages. In 1820, the Bombay Education Society formed a Native School and School Book Committee for (1) assisting and improving the existing native schools and for establishing and supporting more schools which might be required for diffusion of useful knowledge among the people primarily in the languages of the country and (2) for providing suitable books for use in schools for Indian children in English and Indian languages. In 1822, the Committee was separated from the society and a new society—Native School Book and School Society—with Elphinstone as President was formed. The objective of the new Society was to promote useful knowledge in the languages of the country. The natives who desired to learn English were to receive it in the schools of the Bombay Education Society.

The Native School Society essentially aimed at providing education, the core of which was western, the medium of instruction the local language. The Native Society also set up English Schools which were conducting education in local language, but added coaching of English as a subsidiary subject. In the primary classes education was wholly in local languages. As the subjects of education were to be different from those covered in the traditional educational programme prevailing in the territory at that time, the society from the beginning faced problems with respect to books, method and teachers.

Elphinstone sufficiently elaborated in his minute of 1823 the programme of education, keeping regard of the above, which became, in a way, the final plan of action for the Bombay Government. The measures required, as suggested by him were ; (1) to improve the mode of teaching at the native schools, (2) to supply them with school books, (3) to hold out some encouragement to the lower orders of natives to avail themselves of the means of instruction thus afforded them, (4) to establish schools for teaching the European Sciences and improvements in the higher branches of education, (5) to provide for the preparation and publication of the books of moral and physical science in native language, (6) to establish schools for the purpose of teaching English to those disposed to pursue it as a classical language, and as a means of acquiring a knowledge of the European discoveries, (7) to hold forth encouragement to the natives in the pursuit of those last branches of knowledge.

In essence the programme had remarkable features. It fully translated the idea, contained in another para of Elphinstone's minute, and referred earlier, that conversion of the native population to Christian and other values leading to support of the British administration was more easily

achieved through education of European Sciences than through missionary activity. Thus the programme provided for extensive facilities for education in what they called useful sciences. In effect, the education was merely value oriented without any touch with the then current socio – economic structure; and there was no reference what so ever to occupational needs of the lower order of the natives for whom such a programme was developed. The second feature of the programme was all the more interesting. It separated out the education of a class of population from the general programme of native education. This education was English based, intended to take the recipients to a much higher level of value orientation so much so that after receiving such education individuals could think and identify more as Englishman than as Indian.

Downward Filtration Theory

In a way, the second tier of higher English language based schools and colleges became the methodology adopted by the Government of Bombay for fashioning the instrument for ruling the country. Thus when the Elphinstone College was set up, it was clearly indicated that the Government hoped that the college would be instrumental in raising a class of persons qualified by their intelligence and moral notably for high employment in the civil administration of India. The Indians educated in this tier were easily distinguished from others educated under the native programme; psychologically these persons would be more British than Indian so that using them in the administration of the country would require no compromise with the colonial objective of the British Government; and most importantly, these persons being a part of the Indian society, and the leading part at that, the administration, notwithstanding its foreign and colonial Characteristics, would obtain a popular colour.

Elphinstone was clear in his perspective while developing the educational programme. Thus he wrote in reply to a circular by Williers that the result of educating the natives, both in English and in their own language, must be favourable to the progress of Christianity, and that the study of English ought to be encouraged by all means as few things could be so effective in enlightening the natives, and bringing them nearer to the British. Elphinstone's policy was latter generalized in the field of education and developed into what was called the downward filtration theory. In it there was suggestion for giving higher education to few and

for depending on the influence of the educated few to filter down to the mass of the population. Sir Erskine Perry, who came as a Governor of Bombay after Elphinstone, propagated this theory and held that as it was impossible to convey to the bulk of the people more than the rudiments of knowledge, instruction should be conveyed to them in their vernacular tongues, but as those vernacular tongues, contained no literature in which the exact knowledge derivable from European education could be obtained, the only mode open for improving that literature and for carrying out the scope and end for all government endeavours was to give to the upper classes, and to such as were particularly gifted, the best English education. In effect, the logic of running the British Administration through the Indians who were converted to English values and ideology was extended to cover also the act of influencing the values of the common people and of bringing them nearer to the Christian religion. It was understood that using Indians for criticising the Indian values and for propagating Christian values could be fare more effective than using missionaries for this job, as was the earlier practice.

In 1840, the Government of Bombay formed a Board of Education composed of a President and three members nominated by the Government and three by the Native Education Society. The Board in its report of 1845 made out clearly the objective of the downward filtration theory. It stated: we consider that in order to make a permanent deep *impression on the Asiatic mind, and in order to fit it for the reception of* the results of western civilization, we must apply our chief endeavours to *the cultivation of higher* branches of learning and of superior orders of minds. The growth of opinions in nations appears to be exactly analogous to what takes place in small circles, in these as in the former the majority have no opinions of their own, they take them from the original mind, from the man who thinks for himself, the man whom they look up to and respect in each caste or coterie. Accordingly, the Board *arrived at the conclusions: the necessity of beginning from above* downwards, when the attempt is made by a Western nation to introduce *their own systems of education, and their own habits of thought, amongst* a people where type and character of civilization have been so wholly [illegible]erent. It further added that by training up men specially for the task of [illegible]ation, by instilling into their minds those positive and exact notions [illegible] European Science is so eminently distinguished over Asiatic [illegible]tributing much higher salaries than currently given to the [illegible]l master, and by giving those little marks of social [illegible]h orientals, perhaps more than the rest of the world, so

much appreciate, a race of school masters might be found who would carry into every village the seed of civilization and improvement.

The Bengal Case : The Alternative Approach

The Bombay methodology thus developed into a comprehensive policy structure covering not merely the fashioning of an instrument but also developing an environment in which the instrument could be most effectively utilized. In Bengal Presidency the matter was approached differently. Involvement of the Government in educational aspects started in Bengal with the needs of the judiciary. At the beginning of its rule, the East India Company applied English law to Indian cases. In 1780, on the suggestion of Warren Hastings, the first Governor General of India, Parliament ordered that in cases relating to social and religious matters Hindu and Muslim laws were to be applied in cases involving the respective communities. Thus to help English judges in deciding cases pundits and moulvis, learned in Hindu and Mohamadan law, and capable of communicating with the judges and their assistants were needed. For meeting this end a college at Calcutta, called the Calcutta Madrasa for the Mohamadans, and one at Banaras, called the Banaras Sanskrit College for the Hindus were set up in 1781 and 1791 respectively.

The study of Sanskrit in this regard was essential for dealing with the Hindu issues. All aspects of Hindu culture, values, civil and religious practices and moral and ethical parameters for social and personal behaviour, necessary for settling disputes were contained in Sanskrit texts out of which alone these were derived. Thus the law courts provided opportunities to the English man to know the Hindu value system intimately. Some also developed admiration for the ethical and structural qualities of the system, and were led to studies of the Sanskrit literature and texts which contained these matters. Such studies led to further admiration both for the Sanskrit language and literature and the Hindu value system.

In a minute on the subject of education, written in 1811, Lord Minto expressed his distress at the progressive state of decay of science and literature among the natives of India. He noted that the number of learned was not only diminished, but the circle of learning even among those who devoted themselves to it appeared to be contracted; that abstract sciences were abandoned; and that the immediate consequence of this state of things was the discurse, and even actual loss, of many valuable books. He added : it was a matter of lament that a nation (British) particularly

distinguished for its love and successful cultivation of letters in other parts of the empire should have failed to extend its fostering care to the literature of the Hindus, and to aid in opening to the learned in Europe the repositories of that literature.

In 1823 the grant of one lakh of rupees, made at the time of renewal of the charter in 1813 was appropriated for the first time. The Governor-General appointed a General Committee of Public Instruction for the purpose of ascertaining the state of public education under the Presidency of Fort William and of considering and from time to time submitting to Government, the suggestions of such measures as might appear expedient to adopt with a view to the better instruction of the people, to the introduction among them of useful knowledge including the sciences and arts of Europe and to the improvement of their moral character. The Government instruction to the Committee included one to complete the arrangements for the construction of a Hindu College and a new Madrassa at Calcutta, recommended in the minute written by Lord Minto.

The Committee was composed of ten members including H.H. Wilson, a great Sanskrit Scholar, as its General Secretary. The Committee established a Sanskrit College at Calcutta and oriental colleges at Agra and Delhi and proceeded with the printing of Sanskrit and Arabic Books on a large scale.

The Committee approached the issue of education honestly and draw inspiration from the ideas of Lord Minto. This was the main point of difference from the approach adopted by Bombay Government under Elphinstone whose objective was propagation of Christian and British values in the name of education in supplement to the efforts of the missionaries, which failed to yield the desired results in this direction. The Bombay circle did not even hide this objective; as in any case, in Europe and England also education was a part of church activity up to the beginning of 19th century and was never considered different from religious instruction.[1] In England, government involved in supporting popular education only in 1833, i.e., twenty years after it did in India, with the sanction for the first time of the Parliament of a grant of twenty thousand pounds in aid of school house and for introduction of the system of grant-in-aid. The Bengal Committee did not view the role of

1. Education played a significant part in European politics, which in the middle ages was indistinguishable from religious movement. In particular, it was crucial in the fight between catholics and protestants giving reformation. Thus the Europeans had good understanding of the political potentialities of education in the societies. These matters have been discussed earlier.

education differently; it continued to be religious instruction and inculcation of social, moral and private values; but it believed on the basis of the thorough knowledge of Oriental literature possessed by men like Colebrooks and H.H. Wilson, who were associated with the government, that there was nothing wrong with the values associated with the oriental religious and culture, that the British administration could be quite consistent with this value system, and that man with this value system and possessed of the information and ideas available in European educational programme could be a source of strength for the British administration, and that there could be no need for spread of Christian religious and Christian values in the name of civilising the Indian natives. Instead, they felt that benefit would be more if they were educated in their own values than if a foreign value was forced.

Reactions in Bengal to the Alternative Approach

In Bengal also, as in Bombay, missionary activities, including establishment of schools, had started by then. Robert May opened a vernacular school in 1814 at Chinsura. He followed it up by establishing other schools. Between July 1814 to June 1815, he established altogether 16 schools. In 1818, Reverend Middleton, the first Bishop of Calcutta opened a missionary college, called the Bishop's College for training young Indian Christians as preachers and teachers and for imparting knowledge of English language to Hindus and Mohamadans. Private individuals, both Indian and English men, also involved in spread of education of English and other subjects which were parts of English educational programme introduced in Bombay Presidency under its project of civilizing Indians and converting them to British and Christian values. Sir Edward Hyde East and David Hare, among the Europeans and Raja Ram Mohan Roy among the Indians were prominent in this area.

Raja Ram Mohan Roy was a faithful servant of the East India Company and was rewarded by money and by the title of Raja for his service. After retirement from the Company service he took up social reformation work in Bengal. He learnt from the Englishmen and was convinced that the Hindu religion was unsound and bigotry and uncivilized and was intolerant of it. He found it ridiculus that a religion could be suggesting the possibilities of washing away the sin of killing goats, through chanting of passages of the vedas and did not bother to be impressed by the positive aspect of the suggestion which was the implicit emphasis that killing goats for eating was sin and also by the effect of the

suggestion which was that most Hindus remain vegetarian although their life and develop a love and compassion for the animals which have no parallel.

Ram Mohan Roy also ridiculed the vedantic doctrine which taught that all visible things had no real existence and was bold enough to bring to Lord Amherst these ridiculus aspects of the Hindu religion in a memorial, in utter indifference to the ideas which prevailed in Europe from the time of Plato and of Bishop Berkaly of England advanced immediately before his time whose discourse on a similar view point the learned men of England could find no answer.

Ram Mohan Roy's zeal for reformation of the Indian Society by bringing in Western values was unbounded. Hindu religion was never based on beliefs, as the organised religions like Christianity and Mohamadanism, but on practices at the social, family and individual plane and has been indifferent to theology and divinity. As there has been no official theology, individuals in different periods wrote and advanced theological ideas, all of which were subsumed under the Hindu religion.

Thus under the Hindu religion, ideas on atheism, monism and paganism were developed and all these prospered and survived, and no body bothered about them since these did not touch generally on the aspect of practices and rituals under the Hindu religion. The practices and rituals, on the other hand, were both private and social and covered every aspect of the life—private, social, moral, ethical and economic—and therefore, regardlessly of individual's likes or dislikes of the rituals and practices, these were performed, as other members of the community were also involved.

These rituals and practices were not imposed on individuals, but people found social life more easy with the rituals and practices than without it. Thus the rituals and practices remained the core of the Hindu social life and remained undistributed, notwithstanding the varieties of theological doctrines which developed in India. Raja Ram Mohan Roy having picked up, though wrongly in the Indian context, from the protestants the idea that religion is a private affairs, also picked up from various doctrines developed in India under the banner of Hinduism, some ideas which were consistent with and parallel to the protestant theology, and developed in India a reformed Hindu religion known as Brahmo Samaj.

It was wholly theological, devoid of rites and rituals and thus most close to the protestantism and the religion of the rulers of India and to his heart.

Thus Ram Mohan Roy vigorously opposed the programme of education developed by the Committee of Public Instruction from the side of enlightened and reformed Hindus and not of Christians and Englishmen. In his memorial to Lord Amherst he made a strong case against establishing a Sanskrit School under Hindu Pundits which the Committee had decided to do. He pointed out, eloquently, without mincing words, and more vigorously than any Englishman could have done (being ignorant of the details of Sanskrit literature, and Hindu system) how fruitless and how confusing the knowledge of Hindu system and Sanskrit literature could be and in which way such knowledge could be indistinguishable from ignorance and could not be the ideal substance of propagation by a benevolent government which had set its heart upon civilizing the natives through education.

He also added that if it had been intended to keep the British nation in ignorance, the Baconian Philosophy would not have been allowed to displace the system of schoolmen, which was calculated to perpetuate ignorance, and that, therefore, the Sanskrit system of education which was also equally calculated to perpetuate ignorance should be allowed to be displaced by more liberal and enlightened system of instruction.

Such was his emotional attachment to the cause, that he overlooked all distinctions between Baconian philosophy and Locke induced liberal and enlightened instruction, which were not insignificant, and that between scholastic education which aimed at building a logically sound theology for the Christianity and Sanskrit system of education, which could cover almost everything except theology, as the Hindu religion did not have an official church for defending the faith and religion, did not provide agents of God, like the Catholic Church for superintending his realm, nor pleaders for arguing the case on behalf of any one of the hundreds of Gods for converting others to Hindu religion, and thus did not need a theology, logically sound or unsound.

Ram Mohan Roy's memorial was passed on to the Committee, but did not impress the Committee by its logic, which was not its point of strength, in any case, or by its scholarship, a substance which the members of the Committee possessed abundantly. The Sanskrit College was started by the Committee, notwithstanding the passionate appeal against it by Ram Mohan Roy. The Committee, in its actions also obtained support from the wording of the initial despatch of the East India Company on the subject of education which enjoined, as mentioned earlier, that the learned natives of India should be encouraged and ancient literature should be revived and improved.

The Views from England

The Court of Directors of the East India Company was, however, finding it difficult to support the Bengal Committee viewing the issue from a pragmatic point of view. There was an essential difference between the Bombay methodology, which the Court of Directors had supported vigorously and the Bengal methodology. Out of the Bombay methodology, there was a promise of obtaining a supply of persons who could be temperamentally Christian and Englishman but wearing the colour and name of Indians. Thus they could appear on the Indian side, whereas serving, without any doubt, the cause of the English administration. One could also, from the side of the Company, if circumstances needed, pass on the responsibility for bad deeds on the natives and appropriate credits for all good deeds.

The Bengal methodology, on the other hand, promised to bring out supplies of persons who could be temperamentally orthodox Indians, with the benefit of formal Sanskrit based education, and possessed of knowledge of English language and European Sciences, as education of these aspects was also introduced as a part of the programme developed by the Bengal Committee. These persons, when admitted to the affairs of the Government, would appear, being Indian by colour and name, on the Indian side. The Court of Directors, however, hád grounds to be apprehensive that these Indian's might really also go on the Indian side, in which case, the English administration in the country of the size of India could become untenable.

Thus the Court of Directors of East India Company in its despatch of February 1829 in respect of the measures adopted for reform of Banaras Sanskrit College and Calcutta Madrassa and for establishing a Sanskrit College at Calcutta clearly indicated that the plan in all these regards was originally and fundamentally erroneous; that the great end should not have been to teach Hindu learning but useful learning, which meant during these days not vocational education but education of Christian and English values. The Company's point of view was made further explicit in its communications of 1827 and 1830 reviewing the proceedings of the Bengal Committee, which have been presented earlier.

With these communications, the issues fell in clear perspective. The Court of Directors, regardlessly of the words used for communicating the intention of education in the past, meant by public educational programme merely policies for raising supplies of civil servants to whose probity the Company might with increased confidence commit offices of

trust, and held that the means for bringing this about was making the natives combined with the ideas and feelings of civilized Europe. The committee on the other hand, took the slogan of provision of useful knowledge literally and developed a programme of education which amounted to expansion of the coverage of the traditional education by adding study of English language and European sciences, which removed all doubts about the usefulness of this programme of education.

Macaulay and the Official View

The dispute between the Court of Directors and the Bengal Committee of Public Instruction did not end easily. In 1835 the matter was referred to the Government by the Committee for final decision. At this stage Macaulay, who was the legal member of the Governor-General's Council, entered the scene. He wrote a minute in strong terms when the matter came before the Government.

In his minute, Macaulay did not touch upon the essential bone of contention between the Court and the Committee. Instead he wrote his minute, which in all appearance was a redraft of the memorial presented by Raja Ram Mohan Roy, with the benefits of all the advantage which Macaulay had over Ram Mohan Roy. His draft had the advantage of his superior command over the English language, of his superior knowledge of history and philosophy because of which he could bring correctly the names of Locke and Newton, and not Bacon, as brought by Ram Mohan Roy; of his utter ignorance of Sanskrit and Arabic literature because of which he had no difficulty in making monstrous statements; and of his position as the member of the Council because of which he did not require to make appeals but only write judgements and views, with or without support of logic and evidence.

He phrased the issue as if it was one of choice of medium of instruction, when as a matter of fact only the content of education was at issue. Court of Directors did not like Hindu learning to be provided whereas the Committee wanted that both traditional and European subjects should be covered under the educational programmes. Macaulay, was not disturbed by this discrepancy, and concluded that the language of instruction should be English because the dialects commonly spoken among the natives contained neither literary nor scientific information and were so poor and rude that until they were enriched from some other quarter it would not be easy to translate any valuable work into them.

He added that he referred to dialects spoken in Bengal Presidency so as not to be reminded that in Bombay vernacular language was adopted as the medium of instruction under the Elphinstone plan. With equal force he also disposed the claim of Sanskrit and Arabic as the medium of instruction, which in any case was not advanced by any party, on the ground that he was told that a single shelf of good European library was worth the whole literature of India and Arabia.

Macaulay possibly knew that he was not making any significant point in the context of the issues under reference; and only at the end gave his point of view on the aspects of the dispute. Macaulay rementioned that the government must do their best to form a class who might be interpreters between the English administration and the millions governed; a class of persons Indian in blood and colour, but English in tastes, in opinions, in morals and in intellect. At this point Macaulay was not ambiguous; there was no longer any issue of good or bad language, of the quantities of knowledge contained in the language, or of science or metaphysics. He understood what the Court of Directors and the ruling English class wanted and felt essential for administering a huge country like India by a nation as small as the British. Thus, however, irrelevant the above conclusion might be in the context of the long, meaningless, mischievous and tendencious writing about the language at the outset, he did not fail to put that on record.

At the end that which was inevitable occurred. The government stopped its support to traditional learning and set about producing in right earnest, and with all the facilities it commanded, the class of persons, Indian in blood and colour but English in tastes, in opinions, in morals and in intelligence. A year after writing the minute Macaulay wrote in a letter to his father in England that the effect of education on the Hindus was prodigious, that no Hindu who received an English education even remained sincerely attached to his religion; that some embraced Christianity. He also added that he believed that if the plan of education was continued there would not be a single idolator among the respected classes of Bengal thirty years hence, and expressed his great joy at such a prospect.

Macaulay's minute was submitted to the Governor-General, Lord Bentinck who concurred entirely with the views expressed by Macaulay. He resolved on 7th March 1935 that the great object of British Government ought to be the promotion of European literature and science among the natives of India and that all funds appropriated for the purpose of education would be best employed on English education. He

mentioned nothing on the issue of medium of instruction which covered the most part of Macaulay's minute but had no difficulty in reading the core of the minute and in taking his decision on the matter. Absence of any mention of the medium of instruction, and in particular, of vernacular languages in the resolution, which followed from the emphasis only on the core of the issue in the resolution, however, made the statement unrelated to the earlier platitudinous policy of educating the mass of the people adopted as a deed worthy of the benevolent Company rule etc.

Moreover, the Company never intended to provide English education to all, but only to few who were to be associated with the administration, whereas the resolution provided impression of a policy of extension of universal English educations. For removing such impression the Bengal Committee with Macaulay then as the President, suddenly realised the need and virtues of education through the medium of vernacular languages and made out its programmes for that, though only sometimes back Macaulay had opposed vigorously such policies. It stated that Government should provide excellent English education to few who would then spread the knowledge in vernacular language among all others. In effect, the Bombay methodology was finally adopted as the general policy of the company in the matter of education of the native.

Situation in the Middle of 19th Century

By the middle of the 19th century, uniform educational system, according to the Bombay methodology was fully established in India. At the top of the level there were colleges, teaching in the medium of English. Below the colleges were schools which taught English language and literature together with other useful subjects in the medium of vernacular language or of English language. At the bottom there were elementary schools teaching in vernacular languages. The subjects of education were all those covered in the English schools and colleges so that the students received all the ideas which their counterpart in England did.

These, were in effect, the curricular which were developed as a part of the liberal educational programme in England. In 1844 Lord Hardinge in a resolution enjoined that in every possible case a preference should be given, in the selection of candidates for public employment, to those who were educated in the institutions established under the programme of education of the company, and especially to those who had distinguished themselves therein by more than ordinary degree of merit and attainment

This was followed by a proposal of the Bengal Council of Education for establishment of a University at Calcutta with the view of conferring upon the large and increasing number of highly educated students of public and private institutions some mark of distinction by which they might be recognised as persons of liberal education. The proposal was supported expectedly by the Government of India being directly related to the resolution of 1844 but was considered premature by the Court of Directors But after ten years decisions was taken to set up three universities.

Wood's Despatch

Wood's despatch, in effect, summed up the aspects of past educational policies and experiences which were to form the core of the Company's educational policy in India, and instituted the appropriate agents and instruments for implementation of the policies on behalf of the Company. For unknown reasons, this despatch was hailed by Indian educated persons as the Magna Charta of Indian Education. The despatch made it clear that encouragement of education was important because it raised the moral character of those who partook of its advantages and supplied the government with servants to whose probity they might with increased confidence commit offices of trust. This statement of objective figured also in the past in a despatch of the Court of Directors, made in review of the policies proposed by the Bengal Committee of Public Instruction.

About the content of education, the despatch made clear that the education the Company desired to see widely extended through all classes of people in India was that which had for its object the diffusion of the improved arts, science, philosophy, and literature of Europe; in short, of European knowledge of less high order, but of such a character as might be practically useful to them in different spheres of life. It also made clear that the medium of instruction should be generally vernacular language, and only in the case of higher education English should be used as the medium of instruction. This amounted to formalization of the Bombay methodology in total.

The despatch continued the uses of such terms as practical, useful, moral upliftment, knowledge suitable to every station of life for characterizing the programme of education suggested therein, as in the earlier writing on the subject, but remained absolutely indifferent about the vocational and occupational aspects of life, and about the knowledge and skill needed for that.

It also did not deviate from the previous suggestion about provision of knowledge of European sciences in the name of practical and useful education. It further declared that the government institutions being for the benefit of whole population, the education imparted in these schools should be exclusively secular. As the education of European sciences and philosophy and English literature. were effectively education of Christian values, and particularly liberal values, a point which was noted by Elphinstone for which he felt that the English educational programme built around liberal ideology could be a better instrument for carrying Christianity to India, than the missionary activity, the suggestion merely amounted to barring instruction of Hindu and Muslim religious ideas in the schools and thus to ensuring propagation of only Christian values as a means for what was declared as the moral improvement of the population.

Standing of Liberal Ideology in the West at the end of 18th Century

Per se, the English as also the European philosophy reached a dead end by the end of 18th century. It ceased answering any question; whereas was buried by the weight of questions it itself raised. For sometime the European and English philosophy was dominated by the English philosopher Locke. His strength lay in the manner in which he combined scientific investigation with metaphysical speculation, and made, so to say, science a part of the philosophy. He also developed a general theory of knowledge which applied to searches of truth both in the empirical and in the metaphysical realm. Most importantly, his ideas provided logical basis both for protestantism and liberal democracy. Thus the area covered by his works became essential subjects of study from the side of religion, science and politics.

Locks, however, achieved such prodigious feats by being exceedingly illogical in his own works, which became in one sense his strength, for otherwise, all these unrelated materials could not be put under one umbrella. Being so important and crucial in the progress of thought of the age he also induced studies of his own works and ideas by others.

The result was that by the end of the 18th century a state of complete stalemate was reached with Hume's works in this area. In particular, his theory of knowledge and his ideas that scientific knowledge was derivable through speculation, and was speculative in nature, and was concerned with answering why rather than what were shown to have no logical foundation. Hume's scepticism, however, did not affect the enthusiasm of the English educated persons immediately.

The economy was progressing vigorously, and as most persons did not see the link of this growth with colony and piracy, faith in the contribution of science and knowledge and correspondingly of Locke's ideas survived. This was strengthened by the development of classical economic ideas in the hand of Adam Smith, in close symmetry with the philosophy and ideas of Locke and liberalism. By the end of 18th century and beginning of 19th century, even in the field of economic writings despondency appeared. Other classical economists who followed Smith, like Ricardo and Malthus, prognosticated by following similar speculative methods as Adam Smith utter stagnation as the end of economics built on classical relations.

Thus, as a matter of fact, at the beginning of the 19th century England in particular and Europe generally had nothing to offer in the form of pure knowledge. Outside of pure science, taught in the universities, all other aspects were matters of dispute; issues were only verbal and linguistic, and the environment was again scholastic of the middle ages.

Protestant Belief and Liberal Educational Programmes

The link with the religion in the context of which all these discourses, including scientific speculation developed was, however, unshaken. Thus regardlessly of the content of knowledge it offered, education of English, science and philosophy could be always a valuable means for extending protestant—oriented values. It was therefore, this end, as was explicitly stated by many persons involved in the development of the official educational programme, which was behind the establishment of liberal educational programme in India.

Behind religion, other crucial aspects were also involved. Protestants, as Christians, believed in one God and no more; and also in the idea that God not only was the creator, but also was responsible for the behaviour of natural things. His strength lay essentially in the knowledge he possessed. Catholics held that only the Church fathers have share of this knowledge and no others; and therefore, others, in order to move along the path set out for them by the God, must follow the guidance of the Church. The protestants, on the other hand, held that the knowledge is obtainable by others also, so that one need not follow the Church, but might as well follow those who by other means acquired the knowledge.

The theory of knowledge, and particularly the philosophy of empiricism which developed out of the ideas of Locke showed how speculations of the individuals about the natural events could be

considered as knowledge and why the persons making such speculations deserve the same respect as the church fathers were given in past, and also why the church fathers whose saying did not conform to the Lockian theory of knowledge did not, in any case, deserve any respect.

Individual's claims to universal respect and authority, whether as Catholic father or as protestant ruler, depended very much on the stipulation of only one God, so that in the heavenly plane knowledge is not shared, and is capable of being passed only or wholly to some one or some group on earth, for acting as sole agent of the only supreme being. With many Gods, many sole agents might turn up; and in any case, universal authority and respect would be difficult to sustain.

Therefore, the spread of Christianity was initiated in Europe through an all-out war against paganism, and in those areas where Christianity was established church automatically entered with claim for respect and authority as the sole agent of the supreme being capable of interpreting the God's wishes. With protestants all these remained the same, expect that the claim on authority and respect was made not as the sole agent of the God but as being in a position to acquire all the knowledges which the supreme being possesses, i.e., the secrets of nature.

The protestant rule, therefore, depended on establishing the supreme virtue of knowledge (whatever the word knowledge might mean) and a claim on authority and respect on the ground that the knowledge is possessed by the ruler. In effect, these are the contents of liberal science and philosophy, and correspondingly, of the liberal educational programme.

In one part of the programme students are taken forward to understand which sorts of statements should be considered as revealing secrets of nature, and thus are parts of knowledge possessed at the first instance only by the supreme being. This was necessary because ordinary people could not be expected to recognize a thing which is said to be secret, and might on being presented with one confuse that with an ordinary thing, where as unless they recognize the thing as one of the secrets of nature and a part of the knowledge of the supreme being, they would not pay the appropriate price to the bearer of the secret.

Thus, men must be prepared at the outset to recognize when a secret comes and to appreciate the great beauty which the secret possesses. This part of education is completed with provision of guidelines to the students on the basis of which they should recognize a secret. These discussions constitute the education of liberal philosophy. The course on liberal science covers then the presentation of the secrets of nature, for supporting the claim that knowledge is lying in command of the rulers.

Logic of Liberal Educational Programme for India

Thus a liberal educational programme was essential for India so that the Indians could have no difficulty in recognising the qualities of the Britishers, as being in possession of supreme knowledge, and the English rule as a Divine necessity. It was also essential in this context that knowledge of Sanskrit based literature which was the foundation of Hindu religion could not be a part of the new Indian educational programme. There could be many reasons for that. The most important was that the Hindu religion and Hindu social, cultural and economic life were integrally linked and so complete in one plane that Hindu had never any difficulty in living with one, or many, or even no God, being at the same time perfectly religious and pious.

One consequence was that the Hindu God (or Gods) was not distinguished from man on the basis of the quantity of knowledge of the secrets of nature possessed. A Hindu, so to say, would be quite happy with Kepler and his descriptions of planatory orbits and would not feel very much enriched given the secret of gravitational pull which Newton brought out, seeing behind the two versions merely an issue of form and content which is avoidable. Such a state of mind, i.e., such indifference to pure knowledge could not be encouraged when a liberal educational programme is executed.

Moreover, a paganison and worship of idols of varied forms occupy a prominent place in the Sanskrit based literature. This could be interpreted as encouragement to a too-frivolous or too-familiar attitude towards God. In one sense, it opened up the possibility of conflict among the gods and among the agents of God; in another, such an attitude towards God could not be conducive, to the ideas propagated through the liberal educational programme.

The liberal system was an English product and was responsible for achieving finally the end which renaissance and reformation had set upon. The Catholic Church in the last stages of its supremacy in Europe operated in three wings. The most important was the clerical establishment with Pope as the head, going down to the parish pastor in a rigid hierarchical arrangement. Another wing of the church operated with the government and engaged in public functions at all levels. The third was the part associated with the schools and universities which also functioned as establishments of the church.

Among these, socially and economically most deprived was the academic body associated with the schools and colleges. In part it could have been the jealousy of this group which initiated the renaissance and reformation in Europe. The movement originally started against the supremacy of the papal order and not against the institution of church. The enthusiasm generated under renaissance was taking the movement at some stage in the extreme end and started generating hostility against the religion and Christianity also, but such tendencies were checked under the reformation movement which kept only the anti-church stance on focus. In particular the reformation movement aimed at establishing superiority of the academic wing over the clerical establishment of the church.

In its fight against the papal order, the reformists relied mostly on ideas which were humanistic and individualistic so that in the quarrel between the two groups support from outside could also be obtained. This acted as a double edged sword and the result was that the institution of church as a whole lost the position it had occupied in the past. The reformists also did not gain control of the church and had to set up alternative establishment. The new establishment of the Protestant church also began to share the general disrespect of the people for the church which the reformation movement itself induced. In effect, as a whole, the academic wing did not gain by the coup in Europe.

In a significant way, the clerical wing, by the counter reformation consolidated some of the grounds it had lost, though it had to subordinated itself now to the institution of national state, which gained primarily in the quarrel among the branches of the church.

The only exception in the general order of events mentioned above was England. In this respect the development of the idea of liberalism was crucial.

Individuals involved in renaissance and reformation movement were mostly critical of the papal order, and at the latter stages of the structure of order and authority of the spiritual and moral beliefs in the society. Their ideas and statements were destructive, and ultimately they merely succeeded in destroying all foundations on which claims of earlier of generation of middlemen in the society were based. Since they did not advance any constructive ideas, they also did not build up any claims for themselves. Their ideas of humanism and individualism which they used for demolishing the authority of the church also went against them, and in the process they lost the small privileges which they shared with the other members of the church in the past.

Liberalism developed, on the other hand, ideas which had a constructive overtone. As part of the protestant and reformist movement it began with the ideas of humanism and individualism and of equality, but allowed for possibilities of inequality and privileges for some on the basis of quantities of knowledge possessed. It built ideas of knowledge, epistemology and of science in such a manner that the academic bodies were easily separated from others and could claim all the privileges with the objective of which the reformation movement originally initiated.

Thus, while in Europe, one of the immediate result of the reformation movement was that the Kings acquired the authority which the church lost, in England both the king and the church lost authority and the academic community acquired all what they lost. In England the movement received considerable support also from the newly rising business community; and in order that they could also without academic knowledge, gain a part of the privilege in the otherwise equality based society, Locke glorified the possession of private property and income therefrom and held that as consistent with freedom and equality in the society.

England introduced liberal educational programme in India, thus with the conviction that thereby the supremacy of intellectuals could be established forever, and that, as long as the superiority of English intellectuals could be established this would also amount to establishing a permanent British rule in India. Wood's despatch made this quite clear by the suggestion that the aim of education in India should be imparting European education of less high order. Moreover, so long as the educational programme remained liberal in structure, which was also the pattern of education in England, the relative superiority could be held out and used to bolster up the claims of English rule in India with support also from the Indian intellectuals.

Liberal ideas and philosophy represented, in a way, the climax of a process which started with the Greeks. It evolved out of complex concatenation of historical, political, social, religious, economic and linguistic forces and events of Europe. England carried these ideas to India and her other colonies in Asia and Africa and thereby linked the continents in a universal system. England in the process gained enormously; it ruled half the world for hundreds of years giving all the time the impression that the rule was merely civilizing the barbarians. Significantly, civilization in these societies did not improve either material or moral conditions of life in these societies, notwithstanding the widespread extension of liberal values and education. It calls for detailed investigation of the ideas and the system which these societies obtained from England.

CHAPTER VI

ISSUES OF EDUCATION AND MANPOWER PLANNING*

The State of the Indian Economy

The indicator usually used for measuring the achievement of an economic society is the gross national product and the gross national product per head of the population. According to data provided by the Central Statistical Organisation, the gross national product of the Indian Union in 1970-71 was valued at 36452 crores of rupees. The GNP increased to rupees 50767 crores at constant 1970-71 prices in 1980-81. The per capita net national product in 1970-71 was estimated as 632.8 rupees; it increased to rupees 700.4 at 1970-71 prices in 1980-81.

The average rate of growth of net national product during the period 1970-71 to 1980-81, was 3.43 per cent. The growth of net national product has not been steady in the society. There was a period, for example, during 1978-79 to 1979-80 when the absolute value of net national product decreased sharply (—5.31 %). There have also been periods when it increased very sharply, for example, during the years 1976-77 to 1977-78 and 1974-75 to 1975-76 the growth of national product was more than nine per cent.

The average rate of growth of per capita income during the period 1970-71 to 1980-81 was 1.12 per cent. In respect of the per capita income also the growth rate has not been uniform over the decade. Since growth of per capita income is obtainable as differences between the growth rate of net national product and the growth rate of population, the latter remaining uniform over the decade, the growth of per capita income has followed the pattern of variation of growth of gross national product.

The real achievement of the national economy as an indication of the

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productivity of the society is not reflected wholly in the growth either of gross national product or of the per capita income. The growth is necessarily associated with the efforts made by the society towards its achievement. In particular, the economic growth realised during a period is the result of immediate satisfaction foregone by the society through its savings. Thus, in a way, the real measure of society's achievements in the economic front is obtained by comparison of the rate of economic growth with the rate of savings of the society.

In 1970-71, according to the data provided by the Central Statistical Organisation, the gross savings rate of the society was 16.8 per cent. In the same year, the rate of capital formation was 17.8 per cent of the national product. The difference between the rate of capital formation and the rate of savings (domestic) should be accounted by the extent of net capital inflow from abroad. In the same year, the net capital formation rate was 13 per cent of the net national product and the net domestic savings rate was 12 per cent.

The rate of gross saving increased to 21.9 per cent in 1980-81. The net savings rate was 16.7 per cent in that year. The rate of gross capital formation in 1980-81 was estimated at 23.8 per cent and net rate at 18.7 per cent.

In a way, the data on growth of national product and annual amount of capital formation can be used for determining the amount of capital which the society has to make available for obtaining one rupee worth of annual additional output. In particular, the marginal capital-output ratio which is a measure of the above relationship is obtainable as a ratio of the savings rate and the annual rate of growth of national product. It would be appreciated that in general the greater the amount of capital needed for obtaining annually a rupee worth of additional output, the smaller is the effective productivity of sacrifices needed for buying a rupee worth of additional income by the society, and that the more the marginal ratio is, the smaller is the degree of achievement on the economic front by a society when compared with a given figure for a year.

The rate of growth of national product as has been noted, was on the average 3.4 per cent during the decade of 70s. In 1970-71, therefore, assuming a steady growth of the national product, the marginal capital-output ratio was slightly more than 3.8. In 1980-81, it increased to 5.5. These figures mean that in 1970-71, the society required to save and invest 3.8 rupees for obtaining an annual increase of one rupee worth of output, and in 1980-81, it required to save an amount of 5.5 rupees for obtaining a similar annual increase in output. There is, therefore, clear

evidence that the achievement of the Indian economy in relation to efforts made for obtaining a rupee worth of output steadily decreased during this decade.

The situation was, as a matter of fact, the same during the entire period after Independene. The rate of growth of national product for this country has been, on the average, of the same order, i.e., 3.4 per cent per year, during the earlier period of 1950-1970 also. The rate of saving estimated at the beginning of the Second Five Year Plan was of the order of 7 per cent. The rate of capital formation at that time could have been of the order of 9 to 10 per cent, as it is known that a significant amount of investment was financed by drawing upon the sterling balances. Using the rate of growth of 3.4 per cent on the average, the marginal capital-output, ratio for the initial years of the Second Five Year Plan turned out as something like 2.8. Thus, it follows that this increase in the marginal capital-output ratio, i.e., the increase in the extent of efforts needed for a rupee worth of additional output has been a regular feature of this economy ever since the country initiated programmes for its economic development.

Fraudulent Ideology

For good or bad reasons the aspects of economic development of India has remained in the firm control of the economists. This has become so because it has been commonly accepted that increase in the rate of production of goods and services in any society depends on those factors which are the subject of studies under the science of economics. The appropriate concepts and ideas in these regards were developed as a part of the liberal — Marxian ideology.

Vigorous economic planning started in India during 50's. The Indian Statistical Institute with Prof. P.C. Mahalonobis as the Head was given responsibility for developing the basic methodology of economic planning for development of the Second Five Year Plan Programme. The methodology developed threat became, so to say, the methodological basis of the economic plan of our country. The theoretical framework and the relationships envisaged in the Mahalonobis formulation was preserved in the subsequent plan also, though further analytical sophistication were brought in the preparation of these plans.

The plan was essentially an economic plan and all the control parameters for inducing growth in the economy were drawn from analysis of economic growth which was a subject of vigorous discussion

at that time. The economists from all over the world, who were involved in analysis of economic growth and planning, were invited to work for the development of the Indian plan frame. Crucial parameters identified for manipulation for inducing growth in the country were savings and investment rate, allocations of investment to different forms of activities capital-output ratio, capital labour ratio and coefficient of reinvestment. All these coefficients were drawn from various models of economic growth which were current at the time of plan formulation.

The liberal ideology was founded on a fraudulent foundation. The ideas emerged as a part of the controversy between the Protestant and Catholic which started at the time of reformation in Europe. The liberal thought adopted the essential slogan of the protestants which was that the individuals were capable of acquiring knowledge and that, therefore, they could be more effective when free than when subject to controls imposed by the Catholic institutions. Thus, liberty, freedom and equality for all became an essential core of the liberal ideology.

In economics the concepts of liberty and equality were introduced through ideas of maximising behaviour of all individuals in the society. Pursuance of self-interest by individuals in the society was considered worthwhile and in tune with expression of liberty and equality. Society was considered as collection of different groups of individuals, like producers, consumers, labourers etc., with each group having distinct self-interest—producers trying to maximise profit, labourer trying to maximise return from labour, and consumers trying to maximise utility through consumption of various forms of goods and services. The economic theory was also built up to show how the exercise of self-interest by these groups, which were apparently contradictory and conflicting, could lead to situations wherein all individuals regardless of the groups to which they belonged could maximise whatever they desired as members of the economic community. Theories were also developed to show how in the process of conflict and competition among individuals, an optimum allocation or resources were obtained yielding maximum satisfaction for all. These discussions and the development of consequent theories were the core of economic analysis under what came to be called a neoclassical system.

Side by side the liberals also adopted another aspect of protestants' belief which was that the universe is fully law governed with a Supreme being controlling the orders of events.

The modern science and in particular the science of Physics developed out of the belief of the scientists about the existence of an ordered universe. It began developing (after reformation in Europe) with the

efforts of the scientists to bring out this natural order of events. The effort was made both for laying bare the greatness of the God and for demonstrating possibilities of knowledge for individual through scientific endeavour. The early scientists like Kepler and Maupertuis were explicit in all these regards.

In economics physiocrats first tried to develop the concepts of natural order. They also tried to build up the order in the systems of production and distribution in the community. The concept of natural order was subsequently assumed to be all pervading, because of which even the name of the subject was changed from political economy to economics so that search for the natural laws could be made the end of all endeavours in economic research.

The two ideas—capabilities of free will and natural order of events—are starkly contradictory but the liberal ideology persistently maintained this contradiction in its own ideology. Within the political sphere it has played the aspects of liberty, equality and freedom, and in other areas has played the aspect of an ordered universe and made is acquisition as the essential core of knowledge.

Science of economy developed with the presentation of the picture of natural order by Adam Smith. He showed how in the exercise of the faculty of self-interest among individuals economic development of the society arose. The engine of development was also stressed as the accumulation of capital by the capitalists. Adam Smith showed how this urge of accumulation by the capitalists under the impulses of their self-interest did bring about conditions wherein the interest of others who were not capitalist could be satisfactorily served.

Marx also founded his communist ideology on the two tenants of liberalism. He believed in natural order of events and in the benefits of liberty, equality and freedom for all. In search of natural order in the sphere of economics he also adopted the Smithian category of accumulation as the engine of economic change. He developed therefrom rigorous economic relations between growth of capital and growth of output in the process of development. Rigorous expositions of these formulations were presented through his scheme of extended reproduction. The scheme brought out not only his ideas of the relationships between capital formation and growth but also that between saving and capital formation. In this formulation the economic growth was presented as a mechanical phenomena, governed by a set of structural relations. The order of events in his system was to lead to stagnation, but it was shown to possess the capability of continuous

growth with control of means of production passing in the hand on the working class.

In both cases labour has been taken as the basis of value and production, and economic growth has been shown to be dependent only on the capital accumulation through savings. In both, the natural order of economic behaviour has been made wholly dependent on the relationship between growth of capital and output, and thus has been made independent of human intervention. In effect, this independence of economic behaviour of human intervention has also been used for an ideology of natural order applicable in economic sphere.

Strongly founded on this idea of natural order, further development in economic discussion has merely gone into searches for diverse manifestation of this feature of natural order. Free will has also been accommodated in a way in this conceptual framework. It is now no longer believed that there is a unique path through which each economic society would traverse. It is instead believed that given the natural relations between the growth of capital and output it is possible to set out independent paths for different societies. From this, has developed the ideas of economic planning and economic policies. Societies have been allowed to have a choice of path and capability to travel along that. It was, however, been limited by the basic relations which are held to be natural.

Ideas in these regards were formed and refined on the basis of developments of lines of analysis as input-output system, linear programming activity analysis etc. These made possible visualization of directed development for satisfying specific objectives within an equilibrium, framework and at the same time within the framework of natural economic relations.

Economic planning in India started with this appreciation of the engineering capabilities of the economists. Since the basic relations and the idea of natural order were uppermost, the crucial parameter for search of path was again taken as the growth of capital. In strong conformity with this idea, it was also believed that men in societies could not be expected to influence the path of development by any means other than the determination of the rate of saving. As a result of which the primary emphasis in all the plans has remained the increase in the rate of saving. In the process it has also achieved a rate of saving of the order of 23 per cent, starting from 7 per cent in the early fifties.

The theoretical basis for linking savings and economic growth was obtained from the theories of growth developed by Harrod and Domar initially. It was shown that the rate of economic growth is obtained as a

product of savings rate and the output-capital ratio. As the output-capital ratio could remain constant, it also followed that the rate of economic growth could be proportional to rate of saving in the society.

Planners all over the world also believed that though rate of economic development dependent on the natural relationships between growth of capital and output, other inputs including manpower were also necessary for supporting this rate of development. From this appreciation, also followed the need for working out the requirements of manpower for sustaining a given rate of economic development. It was in this form alone that the contribution of manpower in the economic process was appreciated. Within this framework of thought manpower planning also came to understood as working out the requirement of manpower of different categories, and feeding the information to the educational administrators so that the growth process could continue without difficulties from the manpower side.

Analysis of the above type has been called the manpower requirements approach and was followed in almost all countries in the name of manpower planning. The estimates were expected to ensure supplies of various categories of manpower according to the needs of the economy. It was also believed that with such knowledge not only economic requirements would be met but also unemployment of educated manpower could be avoided.

The whole approach has been fraudulent because the intention was merely to harmonise two essentially contradictory things. A natural order of events and creative ability of mankind do not go together, being inconsistent with each other. Any ideological formulation, therefore, which tries to harmonise these cannot be anything else than wrong. The facts of economic history, and in particular, the Indian situation during the last 30 years, which have been a period of rigorous and close manipulation of the economy along the liberal- Marxian Ideology show conclusively that the economic path could be very much different from the path visualised from the natural relations.

. In fact, the Indian evidence is sufficient for declaring the ideology and the related theories as fraudulent. India has been the only country in the world which followed totally the suggestions of this ideology and did nothing else. Therefore, the results achieved can not be ascribed to another cause than the manipulation under this ideological framework.

Contribution of Population to Economic Growth in India

It is not customary in economic analysis to bring in the aspects of population growth in discussions about economic development directly. In discussions of economic growth in the context of under-developed economies on the other hand, the growth of population is shown to be a deterrent It is in this sense alone that the population question is discussed as a part of analysis of the process of development.

In particular, it is argued that a high rate of growth of population, through the consequent increase of the proportion of dependent population in the country, increases the rate of consumption, and therefore, reduces the rate of saving. In this form the proposition is different from the Malthusian one, though the consequence of stagnation is stipulated in both cases.

There is simple numerical relationship between growth of output in a society and the growth of labour. It is that the rate of growth of output is a sum of the rate of growth of labour and of the rate of growth of output per unit of labour i.e., of productivity of labour. The rate of growth of labour is related to rate of growth of population through the working force participation rate. If the participation rate is constant the rate of growth labour and the rate of growth population are equal. In this way a numerical relationship is obtainable between the rate of growth output and the rate of growth population.

In the Indian context it should follow that out of the rate of growth 3.5 per cent per year achieved by the entire economy, slightly more than 2 per cent was contributed by growth of population and the remaining 1.5 per cent or less by the growth of the productivity of labour. However, it must be realised that though mathematically the rate of growth of output can be broken down in the above two components, there should be no reason to believe that factually also the contributions have been in the given order. The fact is that the number 5 can be broken in the components of 4 and 1 as also in the components of 2 and 3 and that whether a particular break down is correct or not is a factual question which can be checked, only by the aggregates. In the economic sphere, however, it might not be very easy to separate out physical contribution of the growth of population and of growth of productivity of labour in the total growth rate of output. It is only possible to check these components by comparing with related magnitudes.

Contribution of population in the growth of output is available from the growth of working force components in the population. The workers

are identified as those who participate in the economic activities. As they earn subsistence therefrom, it could be only out of the output produced by them. *It should follow that the growth of work participation involves the* growth of output. To this extent, a part of the contribution by the growth of population is established.

In India during 1971 to 1981 the proportion of population engaged as whole time workers remained constant. The proportion of all workers in the population, on the other hand, taking both the whole time and part-time workers increased very significantly during this period. This means that the growth of workers in whole-time man units was higher than the growth of population. From this should also follow that if each person had produced only that much which was needed for surviving (which they **evidently did having survived) then the total growth of output** could not have been at a rate less than the growth of workers in the society. It also follows from this that the component of contribution by the growth of population could not have been less than the rate of growth of population and might have been even more than this rate being associated with the rate of growth of workforce in whole-time men unit.

It is, believed in India that in the traditional sector of economic activity growth of employment might only mean increase of disguised unemployment or underemployment without adding to output. If this were so, evidently the growth of output should not be proportional to growth of counted workforce in India. This proposition is difficult to prove or disprove. There is, however, some correlated information which has significance in this regard.

In the rural areas where traditional economic activities are predominant most persons are either self-employed or employed as casual wage labour. In 1977-78 when 32nd round of the NSS was conducted 62 per cent of the male main workers were found self-employed and 27 per cent casual wage labour. In the 38th round survey, conducted six years after, proportion of self- employed was found 60 per cent and that of casual wage labour 30 per cent. As there was no increase of unemployment rate in general, it meant, at the first reading that the growth of employment during this period could not be associated with growth of underemployment which could be essentially a characteristic of self-employment. As there is no evidence of a fall in the average real income of casual workers in the country, and moreover, as the casual labourers are employed only when there is work, such a conclusion necessarily follows.

During this period the proportion of self-employed female main

workers also decreased. In this case as well the group gaining was the casual wage labourers. In the 32nd round survey 56 per cent female main workers were self- employed. This proportion decreased to 54 per cent in the 38th round survey. The proportion of casual wage labour increased during this period from 40 per cent to 42 per cent. Thus, by and large, the evidence does not show any increase of underemployment associated with growth of employment.

There is also some evidence to show that the state of self-employment in the rural areas does not necessarily mean underemployment of a significant order, as is commonly believed. In the 32nd round survey 82 per cent male marginal workers were found self-employed, and 17 per cent casual wage labourer. In the 38th round survey contrary to the case of the male main workers, the proportion of self-employed workers increased, being 87 per cent. During this period the proportion of casual wage labour among the male marginal workers decreased — from 17 per cent to 11 per cent. It should mean, taking the cases of main and marginal workers together, that the relative loss of mandays in self-employment as indicated by the decrease in the proportion of self-employed main workers was compensated by relative gain of mandays in self-employment caused by decrease in the proportion of casual wage workers among the marginal workers. Since for these persons the alternative of casual wage employed existed, such relative transfer could mean that self-employment was not unproductive and was meaningfully comparable to casual wage employment in terms of productivity.

Thus, the contribution of a little more than 2 per cent points in the growth of output of 3.5 per cent by the growth of population cannot be easily disproved. This leaves a maximum of 1.5 per cent as the component of growth of productivity in the society.

Meaningful Issues for Manpower Planners

Besides the contribution by the growth of population the rate of growth of any economic society is dependent on other factors. Analytically this part has been measured by the rate of growth of the productivity of labour. The productivity of labour, being a measure of the quantity of goods that a labour produces during a period of time, is essentially dependent on the quantity of support of capital, i.e., machinery, tools and equipment obtained by the labour and the innate efficiency of the labour. There is no doubt that with increases of capital support, provided done in the appropriate manner, labour is capable of

producing more output per unit of time than what he is capable of producing with relatively less support of capital. For example, an operator with a truck is capable of carrying larger load of goods for a longer distance than what he is capable of doing if supported by bullock cart.

The effect of the factor of innate efficiency of labour is also easily appreciated. For example, the quantity of goods produceable by individuals, given similar support of capital could be widely variable. The temperament of the workers might differ from each other. There may be some without inclination to work providing nothing with the best capital support. Some might be considerate of the machine, and take care of it, leading to less loss of time due to machine break down, while some might be indifferent about these aspects. Similarly output may vary with the same machine per unit of time, if the skills of the operators differ. Efficiency of management could also be expected to affect the productivity of the operators. In particular, a good organisation of production, effective supervision and control etc. can significantly improve the output per person.

It is also possible analytically, to separate out the contribution of growth of capital support per person in the aggregate growth of productivity of labour. In the Indian context, taking into account the fact that the contribution of the growth of population in the aggregate growth rate of output has been around 2 per cent, the contribution of growth of labour productivity in the aggregate growth of output turns out to be of the order of 1.5 per cent per year. During the period under consideration, that is, after the country came under the grip of the economists, the growth of capital support per person has been an order of 4.5 per cent per year. With this rate of growth of capital support per person contribution of this factor in the growth of labour productivity also turns out to be around 1.5 per cent per year. It follows from this that in the growth of output registered in India, contributions have been obtained only from the growth of population and growth of capital support per person. The economy received no contribution from the side of the innate efficiency of labour.

Some information is available regarding the role played by the factor of innate efficiency of labour in different countries. Denison made a study of the post-war experience in 9 western countries to identify why growth rates differed among them. The report of the study contains estimates of annual average growth rate of product per person contributed by the growth of capital per person. One gets thus also, estimates for

those countries of the part contributed by the growth of innate efficiency as a difference between these two rates. The countries covered by the study are — Belgium, France, Germany, Italy, Norway, England, Netherlands, Denmark and U.S.A. One observes from this reports that the contribution of growth of capital support per person in the growth of product per person has been less than 1 per cent for all these countries, when the growth of product per person varied from 1.63 per cent to 5.36 per cent. It is particularly evident from these figures that the variation in the rate of growth of production per person in those countries depended primarily on the variation in the growth of efficiency. The highest growth rate of production per person (5.36%) was recorded in Italy. In that country the contribution of efficiency factor was 4.79 per cent and that of the growth of capital support per person 0.57 per cent.

The figures bear out two things in particular. The first is the irrelevance of the growth of capital support in the context of the analysis of economic growth in different countries. This part goes to prove the utter hollowness of the ideas of growth developed under the liberal and Marxist thinking. The other part brought out by these figures is that the human efficiency factor is crucial in the economic growth process in different societies.

This part of the evidence also brings out the crucial character of human creativity in the activities of human society. In this form it also nullifies the concept of natural order in the behaviour of economics, on which has been founded the entire liberal-Marxist ideology.

The fact that the rate of growth of the economies can be shown utterly dependent on the fact of innate efficiency, and very little on the growth of capital support per person raised altogether different operational issues. In particular, since the agent of growth is identified as the manpower itself, new dimensions of manpower planning necessary emerged. Most importantly, as the growth of the economy is found dependent largely on the innate efficiency of workers, the target for manpower planning in the context of rapid economic development turns out to be the group of employed population.

This is different from the target group established under the liberal-Marxist Solution, and correspondingly, the one adopted in India. Under the liberal-Marxist solution the growth is dependent on the incremental capital, and correspondingly, the crucial component is the incremental workers. In the past, therefore, the target for manpower planning was the fresh young persons, who were to be prepared for entering the economic work in the course of time. Many consequences followed from this

choice. As in which form of economic activity these persons were to enter after initial education and training was not known their education was made as general and as little associated with particular occupations as possible. Thus it could never be expected that these persons on induction would be able to contribute materially to economic output, which required specific skill and knowledge.

It also followed that the knowledge provided in the preparatory stages to the new entrants became the only means to add to the overall content of knowledge of the workforce of a community at any point of time. Since the factor of efficiency of the currently employed workforce was not highlighted at all, it also followed that these marginal additions of knowledge became the only basis for bringing about the necessary improvements in the productive efficiency.

The inadequacy of such a programme can be brought out easily. The size of the present workforce in India is of the order of 220 million. The manpower development programme in India currently consists of provision of general education leading to matriculation certificate or other higher level certificates and degrees and of professional education leading to similar certificates and degrees. The output of matriculates and of other professional graduates who could be expected to enter economic activities each year is of the order of 5 million per year. This small addition per year, in a total of 200 million, on the other hand, cannot be expected to improve in any significant manner the overall knowledge and efficiency level of the working population. It will take a very large number of years to reach a situation in which all the workers will have at least as much education as the level possessed by the present batch of matriculates, which in any case is not appropriate to the requirements of the jobs.

There is no doubt, therefore, that for improving the quality of the workforce a start has to be made with the currently occupied persons, rather than with that segment of the population which will be adding to current stock of the workforce. This is the primary change in the approach to manpower planning which arises from the appreciation of the earlier discussions.

Economic workers from the side of their skill and knowledge are classifiable in terms of occupations or individuals. Occupations represents not merely differences in the skill and capability of the workers but also the conditions and environments of their work. Thus for higher productivity of the workforce improvement requires to be made in terms of the occupational skill and ability. Secondly, since the

improvement of the occupational skill and ability is meaningful only in the context of the environment and conditions of work, the development of manpower cannot be done in isolation of the work environment of the workers. The other dimensions of the manpower planning which arises in the new context are related to appreciation of these features.

Conclusion

The discussions in the preceding pages highlight the specific ways in which education can be used for accelerating the process of economic development in any society. It has also been highlighted that through a properly programmed educational arrangement only such acceleration of economic development process is possible.

Under the traditional economics, built around the liberal-Marxian ideology, the role of individuals in the economic growth process has been totally played down. The growth was shown dependent only on capital expansion, and manpower found a place only in so far as it was needed for operating the new machinery. Thus the educational programme has also been indifferent to the qualities needed for improving the ability of the workers in the work environment. Instead, it only emphasized the development of mental faculties, needed for appreciating the virtues of liberal-Marxian ideology. Being so, the current educational programme did not contribute to the growth process in the least.

Education, as given in the universities currently, is distinguished from training which is related to job and occupation. The paper in effect suggests that the human resources developmental programme, for being effective, should be built around the concept of training. The paper also brings out the essential requirements of a training oriented educational programme for a developing country.

It requires also to be added that a training oriented educational programme is not sufficient for bringing about rapid economic development, though necessary. In this regard the aspect of utilization of human resources are also crucial. In particular, a need for developing industrial research and developmental activities, and employment of definite groups of persons for such are paramount.

PART THREE

Science, Technology and Manpower Options for Economic Development

CHAPTER VII

SCIENTIFIC EDUCATION AND RESEARCH FOR ECONOMIC GROWTH*

The Correlated Educational Issue

Programme of study under liberal science has always aimed at developing an understanding of the behaviour of the external world, interpreting the observed behaviour and of discovering the underlying laws and regularity in the apparently chaotic behaviour of the natural elements. The progress in scientific knowledge is thus the progress in our understanding of the above features. The teaching of science has also, correspondingly, aimed at acquainting the students with the language, tools and concepts used for scientific discourse and with the progress achieved in the understanding of the natural phenomena and in the discovery of natural laws and regularities.

There existed from the very early days a single unified idea of nature, entirely determined by the belief in a supernatural revelation as laid down in the Holy Scriptures. The scientists also from the earliest days thought that it was their task to recognize the God's work in nature and to glorify it by understanding and bringing out the harmonies in nature in scientific way. Thus a search for unity in the mist of diversity become the basic programme in all liberal scientific endeavours.

The search for unity, regularity and invariable natural laws also characterised all investigations in the basic scientific areas. As the natural laws were known to express themselves in specific areas in various forms of physical inter-relationships, in the empirical areas of basis scientific research efforts were largely made to demonstrate the inter-relationships, and to measure the magnitudes involved in the inter-relationship. Further

* Adopted from Development of Human Resources : Population Policies and Manpower and Employment Policies; A report prepared by the Author for India under a Programme of Stories on Cooperation for Development in South Asia.

progress in understanding of the harmonies of nature also followed from this structure of empirical work. Inter-relationships revealed in individual pieces of research could not be expected to contradict each other; moreover, all presentations, so to say, of the natural phenomena should appear as the manifestations of an ordered and harmonious system; and therefore, under the liberal scientific research programme, together with the construction of numerical relationships efforts were also made for development of a picture of the nature which would imply, and thus explain, the diverse phenomena revealed in empirical observation.

A technology adopted for specific function is, in the most general sense, an application of a set of scientific principles for conduct of a given function. Its failure in any manner, which would be a problem requiring solution, is, so to say, a case of a general rule failing to apply to specific cases. Research for resolving industry-based technical problems, therefore, is a search for diverse modes in which given unified principles might express themselves while in operation in given circumstances.

The focus of research in such case is different from the focus in liberal scientific pursuit. Methodologically also the structure is different. In the latter case, one searches for inter-relationships, other things remaining the same, while in the former case one searches for the inter-relationships when other things change so as to resemble given circumstances.

An orientation of the focus of research in the academic institutions so that one can obtain answer to various problems associated with application of basic scientific principles to specific cases also calls for an orientation of the courses and content of science education. The types of questions which the researches would be required to answer, being different from the traditional types of questions, altogether different types of analytical abilities and tools would also be required for such purposes. In a way, development of research with a focus on the problems associated with application of scientific knowledge to every day industrial activities also enlarges opportunities for expanding the scope of different study areas. Some of the problems which would be met in the course of such investigations might be intrinsic to the subject area; and further investigation and analysis of these areas might even afford generalisation of known scientific principles. In some cases such studies might, with problems associated with interface areas, afford generalizations touching on allied subject areas.

In another sense, there is urgent need for making the world of experiments as direct and living as the surrounding nature. Modern science made a division of reality into objective and subjective. While the

latter is capable of appearing differently to different person, objective reality is forced on us from the outside world always in the same way. For this reason only early science made the objective reality as the subject of the investigation and presented an attempt to describe the world to the extent that it is independent of our thought and action. As in this investigation sense ranked only as more or less imperfect aids, it was only natural and consistent for the scientists to try and improve on the senses through artificial means of observation. This idea that our senses are only imperfect aids in the appreciation of the objective world has also guided science further and further away from our immediate world of senses and has given rise to the deceptive hope that refinement of our method of observation, taking it away further from the world of senses, might eventually enable us to get to know the whole world.

This development has brought about a peculiar change in the scientists views concerning the objective world of science.[1] So as to eliminate the errors which could be introduced by the deceptions and inaccuracies of individuals perceptions the scientist now seek to describe the world in a manner entirely independent of their own thoughts and actions. Thus while the idea was to sketch as accurate a picture of nature as possible, the picture turned out with increasing accuracy further and further removed from living nature. In a way, the objective world of the scientist is a product of his intervention and improved technique of observation and not the living world any more.

The withdrawal from living nature has driven the science and scientist into a vacuum totally isolated from the day-to-day world. On the other hand, the positive benefit conferred by science taken in a very broad sense is also enormous so that no body will advise throwing over all science—pure or applied—but to develop science in close connection with daily experience. It is thus not sufficient to understand the laws governing all processes of an objective world, constructed by rigorous abstraction by the scientists ; it is also necessary to visualize at any given moment all the consequences of these laws in our world of senses. On this account, involvement in application oriented researches provides an essential linkage between scientific pursuit and the every day world.

The most important benefit of such linkage lies not in checking the scientists from becoming increasingly abstract and distant from the world of reality, but in its possible influence on the courses of education and on further direction of investigation, and correspondingly on the course of

1. W. Heisenberg : Lectures on Philosophic Problems of Nuclear Science; Fowcet Book, 1952.

future development of the science itself. Progress currently in science occurs from appreciations of the scientists to the effect that the picture of the world built on the basis of current state of knowledge either is incomplete or lacks harmony and symmetry and from inner urge of the scientists to rectify those. With application oriented researches brought in, the scientists would face altogether different sort of challenges. For meeting these new reactions, new answers would be required which would then form parts of the corpus of science and subjects for education and study.

In particular, such orientation of science education would, so to say, narrow down the distance between the science and technology and arrest the present tendency of increasing divergence between the two branches of education to the detriment of science and technology and the society generally.

In a study of the policy for scientific and professional manpower by the National Manpower Council of the United States,[2] this aspect has been stressed strongly. In respect of physicists it recorded two specific types of shortages. First is the shortage of mature men who can supervise projects in government and industrial laboratories seeking to apply new knowledge to civilian and military uses in such important fields as nuclear energy, communications, and electronics. It also records in this regard that this shortage is not wholly a shortage of men with doctoral degree, for this degree alone is no guarantee of competence for work of this level.

The second type of shortage noted by the council was that of men who were capable of performing the applied research and development necessary to carry new ideas into practical application; that the new industrial fields such as television and industrial electronics control were built on recent discoveries in the field of electronics, nuclear energy and solid state physics, and thus physicists were needed to translate these new ideas from the field of physics into the field of engineering. In a general way, the success of such activities depended upon the extent of knowledge of engineering possessed by the physists and of physics by the engineers. Special education and training programme, as a matter of fact, was developed on these lines for engineers and physicists by the Atomic Energy Commission of the United States[3] to cope with similar problems in the atomic energy field.

2. National Manpower Council : a Policy for Scientific and Professional Manpower; p. 195 ff; Columbia University Press, 1953.

3. National Manpower Council, ibid, p.ff 197.

In England also the need for combining education of science and technology, i.e. engineering was stressed rigorously. The Barlow Committee on scientific manpower, as early as in 1946, after the experience of the war argued that "whereas no body can doubt the value of our achievements in fundamental science during the war, we are not always successful in those applications of science which lies in the field of engineering and technology."[4] It was added subsequently in a report (second) of the Advisory Council on Scientific Policy that there was need for post graduate training in technology of pure science graduates. In its first report also it had noted that "though the contribution of pure science to industrial progress will certainly continue to be important, we believe that quicker and more substantial results could be obtained by raising the standard of education with a view of introducing into the highest ranks of industry men who have had specialised training in applied science."[5]

Although science education and economy are capable of being linked through conduct of application oriented researches in the academic institutions there is no essential physical link between the academic instutitions and the rest of the economy which would induce researches of the required sort in the academic institutions. The bulk of research in the academic institution is carried out by the faculty members in their individual capacities; some researches are also carried out under the doctoral programme by the students. As the students receive issues for research from the teachers who guide them, in most cases the issues for research in the universities are those that are faced by the members of the faculty.

In particular, research in the academic institutions is always individual. There is no corporate research programme; nor there are research issues which the faculty as a corporate body could be required to undertake. The support provided by the academic bodies for research is also individual centred-fellowship for doctoral work or support to teachers individually for meeting specific needs of their own research.

Laboratories in the academic institutions are also set up primarily for supporting teaching. In particular, these are intended for demonstrating physically the principles which are described and discussed in the class rooms and their validity. In general, the laboratories are equipped to help develop scientific hypothesis and the validity of the hypothesis. Thus experiment in scientific research, for which facilities are provided in the academic institutions are merely efforts towards developing newer

4. Report of Committee on Scientific Manpower; p. 10, HMSO 1946.

5. Annual.

hypothesis and towards testing the validity and the extent of generality of known hypothesis.

Thus, in a way, the physical facilities available in the academic institutions and the issues in scientific discussions whose resolution constitute scientific advance are totally linked so that by and large a self contained and self supporting and closed universe has been formed. The problems, efforts for resolving these, and the final answers are all generated within this universe with each element of the universe feeding the others either with a problem or with an answer.

Aspects of application of scientific knowledge do not figure in the above configuration. The problems in the above areas are not the problems which torment the minds of the academic society. There are no physical facilities for dealing with such problems so that no opportunity exists for taking application oriented problems to the academic institutions for solution.

There are, in other words, definite structural barriers between the academic world and the world of work. The academic world, moreover, progressively closes round itself making the difference all the more pronounced and rigid. The system has also developed in such a manner that application oriented problems would neither arise in the academic discussions nor even be taken to them.

The effect of such segregation is faced mostly by the rest of the society. In particular, it misses the benefits which science is expected to provide. The situation described above is not unique for this or that country. In almost all countries separation of the areas of pure scientific development from the rest of the economy has occurred in large or small measure. As this separation starts from the adoption of a special goal for science in scientific research and investigation in the academic institutions, there is also a built-tendency for progressive isolation of the formal academic activities from the world of normal socio-economic activities.

The damaging effect of such isolation is mitigated in a way by development of research and development activities outside the academic institutions as part of the usual activities of socio-economic establishments. Scientists and technologists are employed specifically for developing uses for different types of scientific principles discovered through researches in scientific areas. These R.D. organs also investigate the process associated with application of scientific principles in specific industrial uses and find solutions.

Development of R.D. facilities outside the academic institutions

satisfies to a large extent the need of the industries for scientific knowledge. But being outside, such activities do not interact with the activities conducted in the academic institutions with the result that the application-orientation of scientific knowledge in the academic institutions is never achieved through such development. Another result is that the scientific manpower developed in the academic institutions finds little opportunity for employment in the socio-economic establishments, for neither their education nor their training is useful for the type of requirements faced by the industrial establishments.

In one sense separation of R & D activities from the teaching and research activities in the academic institution crystallized in clear focus, the visible distinction between science and technology which existed from the ancient times. In this context, the term technology or applied science or perhaps engineering covers the whole spectrum of activities which are purposeful and practical and the term science, or more appropriately basic science, all activities leading to discovery of a new fact, principle, theory or law.

Until about a century or more the science and technology understood in the manner described above often flourished at different historical times and when occasionally they did flourish in the same period they most often did so at different geographical locations. It is notable that major achievements of ancient technology — agricultural, metallurgy and transportation occurred before the Greeks undertook to develop what is capable of being regarded as formal science. Greeks on the other hand, made no formal contribution to technological development. The second epoch of technological development should be associated with the Romans, whereas the Romans neither made use of the Greek's science nor developed one of their own. The technological changes that helped to bring middle ages to a close and that ushered in the renaissance were completed by 1550 AD whereas the scientific discoveries that collectively constitute the scientific revolution were produced almost entirely after that date.

Coming to the more recent times one notes that during the 18th and 19th centuries Britain was at the height of industrial revolution and acknowledged leader of Europe in production and exploitation of technological innovations whereas it was France which led Europe in science. Even areas of scientific advance and areas of technological thrust were not all the time harmonious. Astronomy, dynamics and inorganic chemistry were the principal fields in which Galileo, Newton, Lavosoir etc. made their contributions, but the technology developed

during those days was little dependent on science developed by these great men of science.[6]

The development of R&D activities as part of individual industrial activities, which started since 1860 in a number of industries in a way set the courses of science and technology in parallel lines. In another sense, it also initiated a routine and formal process of technological development whose main feature was steady application of scientific knowledge to everyday industrial and economic problems for bringing to the activities benefits of discoveries in the field of pure and basic science. The routine and formal character of this line of activity required also development of institutional and infrastructure facilities which would also routinely and formally produce the needed manpower who would know both the principles of modern science as also the methodologies for physical transformation of all sorts inputs to output forms. The knowledge required for such manpower categories were also different from the knowledge and skill required by the craftsman of the industrial processes in that these persons required to process the knowledge of science also. In effect, the success of technological orientation depended upon the development of new areas of education and training and also researches.

Thus, it is the study of engineering and technology in particular and of occupational and professional areas in general which forms the correlate of R.D. environment in industrial fields. This area of study has necessarily the study of what is called science today as a part.

Learning from Experience of Other Countries

The use of science for improving socio-economic activity through continuous improvement of technology, incorporating therein the improvement in scientific knowledge in a massive scale, is by itself a social activity. There occurred during the entire period of human civilization progress in technology of all sorts, improving thereby the technique of transformation in a steady state. There also occurred continuous expansion of scientific knowledge during this entire period. Each in its way helped the growth of the other area, but the two together never in the past developed an upsurge in any society to bring about the type of changes which have been witnessed in some societies in the past hundred or two hundred years. The point of distinction between these two situations should be merely that technological development in some

6. Kulan : Comment on Siegel's paper in Rate and Direction of Inventive Activity (NBER); Princeton University Press, 1962.

modern societies has become a social activity, whereas in other development occurred in bits without having a cumulative effect on each other.

The technological development of the type discussed above which could be identified as one of the basic social activities of a generation has many dimensions. At one place it involved an orientation to deal any problem technologically for which not merely thinking but also resources are devoted. In another place this involved production of manpower who acquired both appropriate scientific knowledge and technical skill, as also a technological motivation and were also able to resolve the variety of problems from a technological standpoint and develop methods and techniques for improving the current states of technology.

The situation of the above type did not emerge accidentally. In any case, both socio-economic circumstances and positive support from state and other corporate organisations were necessary. The support from the states and corporate organisations in the earlier days in most cases did not emerge in the form of positive policies, actions and formulations. Instead of a variety of actions and policies in different directions ultimately led to channelizing individual and corporate endeavours into directions which helped grow the technological environment referred above.

The United States which is today unquestionably the best illustration of a society which can be called a product of technology has been significant for the contribution by its government to the development of this environment. Its most significant contribution in this area has been adoption from the very beginning of a concept of education whose primary end was development of social and economical capabilities for the individuals as distinct from imparting knowledge of the natural laws which was the concept of education in most other countries. The United States Government from the beginning assumed the responsibilities for only such education which could have contributed to socio-economic development of an areas. The President signed the Morrill Act in 1862 establishing a group of universities in each state of the United States with a grant of land from the Federal Government. From the first these new universities were determined to study all the significant problems of the society. These wanted merely to educate citizens and not only the leaders of men and they believed that these universities would become instruments for the reconstruction of society.[7]

7. University Adult Educations, Harper Brothers, New York, 1960. Petersen and Petersen, op.cit.,p. 201 ff, Lord Bounden : Key note address in a Conference of Problems of Science Policy, OECD 1968, p. 24.

The great American west was conquered in the laboratories of the Land Grant Colleges and their Graduates tamed the continent. The new crops and agriculture techniques which were developed in these institutions revolutionised American agriculture. They taught mechanical arts and their graduates transformed industries.

In their educational programme, so to say, America concentrated almost entirely on application oriented studies and applied research so that the men with their attitude and aptitude could develop a climate where all problems could be considered as technological and all problems were sought to be resolved technologically. In the industrial field also the development of R & D facilities and exploitation of those could be the most significant characteristics of their industrial activity.

Throughout the 19th and the early decades of the 20th century, the involvement of the United States Government in scientific policy areas was dictated primarily by practical problems of exploitation of the west, safer navigation, the control of infectious diseases, better farming methods, more accurate standards for weight and measures, conservation of natural resources, technology of warfare and industry. Federal expenditure for research and development in the year of 1900 stood merely at 4 million dollars; it increased to 74 million dollars in 1940. Thus there occurred a gradual rise in governmental expenditure in the field of basic and applied science and overwhelmingly for the latter.

Ever since World War II, there has been a public concern that the rate of scientific progress can be accelerated by concerted national methods to speed the discovery of new knowledge ; that Government is an active if not the key partner in enterprises concerned with producing new scientific knowledge. This concern expressed itself in putting the Federal Government as a prime mover in the field of research and development. In effect, Government undertook the leadership for accelerating the base of scientific development in the country both in general sense and in particular directions.

The result of this role of the Government was an increase in expenditure on research and development by the Federal Government. From a mere 74 million in the year of 1940 the expenditure on research and development by the Federal Government increased to 17 million dollars in 1973.

There are other important aspects also of this growth of Federal expenditure. Only about 25 per cent of the total federal expenditure on research and development is spent intra-mural by federal research agencies. The remaining money is spent by industrial firms, universities

and college, and federal supported research centres administered by industrial firms and universities and other non-profit institutions. In most cases, except for the fund provided by the National Science Foundation to university's researches, the federal fund supports mission oriented researchers.

In a significant way, therefore, this involvement of Federal Government in research and development has expanded not only the research capacities and development potentials for various forms of economic activities but also fostered and consolidated the technological environment which has been the hall mark of American traditions.

In the USSR technological development, which meant a straight way application of modern scientific knowledge for improving the productivity of industrial establishment, was made a cor of economic planning from the very beginning. In the pre-communist days Russia was possibly the most backward, economically and technologically among the countries in Europe. Immediately after the revolution, the leaders of the country, under the compulsion of rapid economic development made technological progress as the most predominant instrument for bringing about required transformation of the economic system.

It's concern for technological development as the basic instrument for economic progress is noted in the very adoption of power development programme as the core of the NEP. By the time the society was ready for the initiation of the First Five Year Plan in 1928, it had also formulated in clear terms the role which science and technology would be expected to play in the socio- economic development process.

In the initial period, the USSR tried to use the prestigious Academy of Sciences which was set up during Czarist days. It was set up for familiarising Russia with current scientific achievements of the continent. For many years it was entirely responsible for the translation and propagation of western literary and scientific works. According to the subsequent charters it's functions expanded to develop knowledge and the practical application of theory. Although the Academy was asked to concern itself with research that would meet practical needs and to popularize such discoveries, it became increasingly involved with theoretical research.

In 1927, by a new character, the work of the Academy was directed

(a) to develop scientific research and to improve scientific disciplines under its directions ;

(b) to study the resources of the country and to encourage their utilisation ; and

(c) to apply the result of scientific research to the economic development of the country.

Thus the 1927 reorganisation was a first step in transforming the Academy into an instrument of the Soviet Society. Other significant development during the early 30's included the adoption of a new Academy statute in 1930; the election of engineering and technology specialists to the Academy in 1932; and formulation of the First Five Year Plan for its research activities. The 1930 statute was based on the idea of a closed connection of the Academy with socialist construction and subordination of this work to the interest of the Soviet State. The statute defined the USSR Academy of Science as the foremost scientific organisation of the USSR. The statute obliged the Academy to enrich science by new inventions and method of research, to assist the utilisation of the natural resources of the country, to develop methods for the application of the theories and of result of scientific experimentation to the task of socialistic construction of the USSR.

During the late 1930's a number of previously separate research organisations were transferred to the Academy. These were accompanied by establishment of new institutions, notably the Academy affiliates in various parts of the Soviet Union. By 1941, the academy embraced 135 primary research institutions. In the post-war reconstruction and further expansion, the USSR Academy and the entire Academy system continued to grow in formidable fashion. By the end of 1956, the year before the decentralisation reform of industrial management, the Academy system comprised 14 Academy of Sciences and included 490 scientific institutions.

By 1957, shortcomings of the Academy system were widely debated in the press. The problem of the poor coordination of research and of the dispersal of forces which lowers the research, slows it down, and delays its practical application, were also discussed in the Central Committee of the CPSU. The discussions were carried out in the context of wider question of reorganisation of industrial administration in the USSR. In this regard it was emphasised that reconstruction of administrative mechanism would exert a positive influence on the development of science and on bringing together the efforts of scientists and specialists for a more effective servicing of the industry and construction, and would improve the functioning of the research institutes and higher and secondary educational institutions. It also emphasised the need to create a central agency in order to ensure constant technological progress in the development of national economy. The task of this agency should be to watch the direction and level of technological development both at home and abroad, to study deeply all that is new and more advanced technology

and to work out and submit for consideration of the Government recommendations for further perfection of technology.

With these objectives, widespread changes in the organisation of research and development were also brought about. In particular, region based organisations were made the basic entity for the management of industry and construction plans. Factories and other facilities formally operated by the Ministries, including most R & D institutions were transferred to this region-based entity. The functions specifically imposed on this regional organisation were (1) raising the technical level in all the branches of industry and construction on the basis of utilising the latest achievements of science and technology, (2) comprehensive improvement of production technology, (3) guiding the scientific research, (4) project planning and design of establishments and also of the educational institutions.

The most crucial element of the Soviet Science Policy has not been the emphasis on application of scientific knowledge to everyday industrial problem but the methodology for translating this emphasis into routine action. In the USSR research and development activities are carried out under three organisations the Academy based organisations, the Ministry based organisations and the higher educational establishments. The Ministry based organisations: which bore primary responsibilities for different forms of industrial/economic activities, were by far the most important elements in this structure and covered more than 80 per cent of all scientific establishments and employed about 80 per cent of scientists and technologists in the R & D activities.

The traditional organisational pattern of Soviet R & D is a net work of specialist establishments which are usually separate, both geographically and organisationally, from industrial enterprises, though both industrial enterprises and R & D establishments fall under the authority of the same Ministry. Each Soviet Ministry is divided into a number of different departments and the responsibility for R & D falls under the Technical Administration Department which acts as clearing house for plans for new technology compiled by the department of production Administration. The Technical Administration department also guides, plans and supervises the work of research institutes under the authority of the Ministry. The different R & D organisations formed under the authority of each Ministry can be classified on the basis of their functions in the R & D spectrum.

The first group is constituted by what is called Branch Research Institute. Applied research is carried out generally in these Branch

Research Institutes. In 1956, before the Branch Research Institute were reorganised on the regional basis, primary emphasis within the ministerial system was placed on industrial research which accounted for 37 per cent of the system Research Institutes and 58 per cent of its scientists. The Ministry of Public Health accounted for 29 per cent of the research institutes and 18 per cent of scientists. The agricultural research accounted for more than 100 research institutes.[8]

The whole Ministerial system grew rapidly following the 1957 reforms. The number of scientific establishments increased by 63 per cent between 1956 and 1961; the number of scientists increased 144 per cent during the same period. This autonomous growth of the ministerial system was in reality a deliberate aim of Soviet Planners and was made possible by the increased allocation of human and financial resources. In subsequent years for effecting coordination between special and inter branch projects mechanisms were also developed.

The second class of All Union organisation was meant primarily for designing new products in the USSR. Important Design Bureaus keep their own independent accounts and operate as separate units; others form constituent parts of research institutes and factories. The design stage of the new project is formally completed by the preparation of the working drawings which are used for the manufacture of the prototype. Some bureaus also have their own experimental and testing facilities and are responsible for the manufacture and testing of prototype. The design of the new production prócesses in existing factories is the responsibility of specialist project technological institutes, each concerned with a particular industry or group of processes. The work has sometimes substantial research component, in which case the institute is known as scientific research project technological Institute.

A major part of technical innovation is concerned with the construction of new factories or the reconstruction of the existing ones. In the USSR the design of new plant and the preparation of plans for the construction is the responsibility of the capital project organisations. These are the third group of R & D establishments in the USSR. The higher educational establishments in the USSR called vuzy are also centres for vigorous research and training activities. The important

8. Discussion have been based on Science Policy in the USSR by Zaleski, Kozlowski, Vinohent, Davies, Berry and Adan (OECD 1967) and Soviet Research and Development by Karol (MIT Press, 1965). The above figures are taken from Zaleski et al, p. 64.

scientific research and project design work of the vuzy are included in the plans of the most important scientific works of the ministries and organisations to which these educational establishments are subordinated. The vuzy is also allowed to take up research contracts from Industrial and research establishments. In general, therefore research in the higher educational establishments is also of R & D nature and serves the national development plans and programmes.

British involvement in institutional policy formulation in the area of scientific development originated in 1916 with the formation of the Department of Scientific and Industrial Research. It was established to stimulate and encourage research by industries; and a fund of one million pound was created for encouraging formation of research associations by each industry.

The response to this attempt was, however, not very encouraging. The lack of support by industry was not simply apathy towards cooperative research, but also towards application of research to production. The Balfour Committee (1929) concluded: "It is when we come to consider the relations between the research associations and the industries themselves, and the extent to which these industries avail themselves, in practice, of the results of research by their own associations" that we find more cause for "disquietade".[9] The Committee attributed the slow progress in research in part to the apathy and indifference towards science which was still far too common in British industry.

After 1930 the attitude of industry towards science and research considerably changed. The Department of Scientific and Industrial Research reported in 1934 that a steady increase in the incomes of the association occurred inspite of the depression in the economy. The impact of the World War II accelerated this trend towards an increase in industrial research.

By 1955 Britain was spending as much as 1.6 per cent of its gross national product on research and development which was even more than the proportion of gross national product the United States was spending on research and development. 29 per cent of this expenditure was made by the government, 64 per cent by the private industry and five per cent by the university.

Interestingly although the expenditure by the government on research was 29 per cent of the total national expenditure on research and development the government supported nearly 75 per cent of the total

9. Balfour Committee Report (final), pp. 38-39 and 215-218.

national expenditure. The private industries which spent 64 per cent of the national expenditure supported only 23 per cent of the national expenditure, 21 per cent out of which was for research within the establishments. The private etablishments received the remaining amount from the government. As a matter of fact the support by the government for research in the private industries was more than twice the amount the private industries spent on research (intra-mural).

The research expenditure by the government was largely for defence purposes; 73 per cent of the government intra-mural expenditure on research was for defence; 82 per cent of the government support for extramural research was again for defence purposes.

The research association movement extended enormously after the war. The total income of the research associations, which was less than one million pounds before the war, rose to about 6 million in 1958. The problem of stimulating industry's financial support for the search association was partly resolved by the passage of the Industrial Organisation and Development Act in 1947. The Act empowered the government to establish development councils, consisting of representations of management and labour in particular industries as well as independent members to exercise functions for improving or developing the services rendered to the community by industries by increasing their efficiency or productivity and for other related purposes. The chief function of the development councils was described as: "the promotion of scientific research and the promotion or undertaking of research and development work on materials, equipment and methods of production".[10]

In a wide measure the British and the American system have points of similarity. In both countries a good proportion of national income is spent on research and developmental activities; in both countries the Government provides the bulk of the fund for research and development ; in both countries again the industrial establishments also spend a considerable amount of money of their own for research and development. The government expenditure on intra-mural research in both countries is less than the extramural expenditure on research through private industries.

The two country's differed, on the other hand, sufficiently in their relation to the academic institutions. In the United States the academic institution, government and private industries are equal partners in the

10. Payne : *Britains Scientific and Technological Manpower*, p. 399; Standford University Press, 1960.

sphere of applied research, whereas in the U.K., the academic bodies, particularly the universities are separate from the government-private industry connection for the applied research.

Significantly, the USSR, shares the American characteristics of bondage between the government, industrial establishments and the establishments for higher education in the area of research and development.

What we have in India

Scientific activities on modern lines started in India during the day of British occupation. The earliest scientific institution started in India was the Survey of India Organisation which was intended for preparing the physical maps of the country. The organisation was started in 1767. In 1851 the Geological Survey of India was founded for working out the deposits of various types of mineral resources in the country. During the 19th century three other organisations were started; which were the Meteriological Department, the Imperial Bacteriological Laboratory and the Haffkin Institute. In the early 20th century Imperial Agricultural Research Institute and Forest Research Institute were started.

Among the organisations mentioned above, two were specifically concerned with the agriculture and therefore, were related to the socio-economic activities of the country. Two organisations were in medicinal field and were concerned with development of vaccins and other medicinal aids for control of epidemic disease to which the country was subject. Remaining were not directly concerned with the economy of the society.

The outbreak of the Second World War brought about a change in the attitude of the Government towards science and technology in the context of the national economy. In 1942 the Council of Scientific and Industrial Research was established on the line of the British Department of Science and Industrial Research.

From 1947 to 1955 various actions were taken for improving the content of science and technology in the economic life of the nation, but no overall programme for scientific and technological development was developed and enunciated. In 1948, an autonomous Atomic Energy Commission was formed; and in 1956 the University Grants Commission was established for planning, programming and improving the Indian educational activities. In May 1956 the Government set up a Scientific Advisory Committee to the Cabinet (SACC) to advise the Cabinet in the

formulation and implementation of scientific policy with explicit and wide ranging terms of reference.

In 1958, the Government of India declared its science policy resolution. It was declared as a preamble to the resolution that the key to national prosperity apart from the spirit of people lies in the modern age in the effective combination of three factors—technology, raw materials and capital—of which the first is perhaps the most important since the creation and adoption of new scientific techniques in fact make up for a deficiency in natural resources and reduce the demand on capital.

It was also highlighted that it is only through the scientific approach and method, and use of scientific knowledge that reasonable material and cultural amenities and services can be provided for every member of the community. Keeping regard of the above, the Government of India decided that the aims of its scientific policy will be (a) to foster, promote and sustain by appropriate means the cultivation of science and scientific research in all its aspects - pure applied and educational, (b) to ensure an adequate supply within the country of research scientists of the highest quality and to recognise their work as an important component of the strength of the nation, (c) to encourage and initiate with all possible speed programmes for the training of scientific and technical personnel on a scale adequate to fulfil the country's needs in science and education, agriculture and industry, and defence, (d) to ensure that the creative talent of men and women is encouraged and finds full scope in scientific activity, (e) to encoürage individual initiative for the acquisition and dissemination of knowledge and for discovery of new knowledge in an atmosphere of academic freedom and, (f) in general to secure for the people of the country all the benefits that can accrue from the acquisition and application of scientific knowledge.

In order to fulfil the aims of the scientific policy resolution the Government of India decided to obtain the advice of the scientific community for which a number of conferences of scientists, technologists and educationists were held during the period of 1958-70. The third Conference held in November 1970, taking note of the broad objective of the scientific policy resolution which was to acquire for the people of the country all the benefits that can accrue from acquisition and application of scientific knowledge, emphasized that it was necessary to grow, foster, promote and sustain the cultivation of science in the country, and to identify and train the appropriate manpower required for the same. It also emphasized that for this purpose it is necessary to identify various sectors of the economy where science and technology

could be applied so that appropriate programmes could be drawn up for each of the sectors and also appropriate institutional mechanism set up within the country to ensure that inputs from science and technology are made available to these sectors. The conference also highlighted the question of allocation of adequate resources for research and development activities of the country and the need for linking this expenditure with the gross national product. The need for ensuring quick transfer of the result of researches in the laboratories to productive centres was also emphasized.

The Government also established a National Committee on Science and Technology for preparation, evaluation and updating national scientific and technology plans.

The science and technology activities in the country are carried out through a number of scientific agencies. These are —

(i) Council of Scientific and Industrial Research
(ii) Indian Council of Medical Research
(iii) Indian Council of Agricultural Research
(iv) Department of Atomic Energy
(v) University Grants Commission
(vi) Defence Research and Development Organisation
(vii) Department of Space
(viii) Department of Electronics
(ix) Department of Science and Technology
(x) Department of Environment

Most of these agencies are involved in direct conduct of research activities through research institutes and scientific establishments under their control. The Department of Atomic Energy, for example, has 12 scientific establishments under it, 8 of which are essentially research institutes and the remaining 4 are engaged in both production and conduct of research through in-house research and development establishments.

The Council of Scientific and Industrial Research is essentially a coordinating body for as many as 42 research institutes spread out all over the country concerning with nearly all domains of industrial activity. These research establishments are required to conduct applied researches in different scientific areas results of which can be applied for improving different production activities. In most cases technologies developed in these research institutes are patented for sale to industrial

houses. These establishments also undertake contract researches from various public sector houses and government departments.

The Defence Research and Development Organisation is also a coordinating organisation for as many as 41 research establishments. These establishments undertake researches for the different service organisations. The Indian Council of Agricultural Research also in the same way is a coordinating body for coordinating a large number of agricultural research establishments spread out all over the country and covers nearly all domains of agricultural activity. The arrangements are similar in respect of other scientific agencies.

Under the rules of the Government of India, the principal responsibilities assigned to the Department of Science and Technology primarily relate to :

(a) promotion of new areas of science and technology;

(b) providing secretarial support to the SACC, and under its guidance, to arrange for formulation of policy statements and guidelines on science and technology, and to follow through then implementation;

(c) promote an appropriate climate for scientific activity.

Under the programme of science and technology promotion the department is currently operating three schemes:

(i) Science and Engineering Research Council (SERC)

(ii) General Research Fund

(iii) Intensification of Research in High Priority Areas.

The first two are ongoing schemes, while the third is a new scheme adopted under the sixth five year plan of the country (1980-85).

The SERC was formed on the recommendation of the NCST Group on Education and Scientific Research. It was suggested that such a council should be formed for supporting and fostering basic research in various branches of science and engineering taking into account the state of art of each areas as well as that science and technology priorities of the country. It was also suggested that the council should work through expert committees to evaluate proposals from individuals and institutions for support of research, newer facilities and such other programmes that would encourage scientific research of high calibre.[11] The General Research Fund is meant to support scientific programmes largely from the educational sector, of a general nature, but which are considered of high quality on peer reviews. This intensification of Research in High

11. NCST Status Report on Research Support, Extension and Education, p. 22; published by NCST, June 1974.

Priority Areas was expected to provide support for specific major thrusts, involving setting up of centres or units on a longer term basis, so as to nucleate and grow rapidly new and important fields of scientific activity.[12]

In particular, these promotional schemes are intended for providing support to members of the academic communities for conduct of basic researches which have potentials for application in different fields of activity. In a way, the Department of Science and Technology also evaluates the possibilities of utilization of the results of the research conducted under these schemes. A report of the evaluation of the results of 80 completed projects is also given in the Department's Annual Report for the year of 1982-83 (page 22). It is observed therein that 10-15 per cent projects yield results which are panentable but the most benefit is in terms of the number of Ph.Ds. produced.

Expenditure on R & D as per cent of GNP in 1958-59 was 0.18. It increased to 0.62 per cent in 1980-81. In 1979-80 the figure was 0.68 per cent; but the figure was quite out of trend, in 1977-78 and 1978-79, the figures being 0.53 and 0.61.

During the period, 1955-1980, the expenditure on R & D as per cent of GNP exceeded the figure of one in a large number of countries—Korea (1%), Yugoslavia (1.1%), Canada (1.1%), Finland (1.1%), France 1.8%), Poland (1.9%), Japan (1.9%) Sweden (2.3%), FRG (2.3%), UK (2.0%), Netherland (2.1%), Switzerland (2.3%), USA (2.5%), Czechoslovakia (4.2%), USSR (4.6%).[13]

India's expenditure on R & D and related S and T activities was about 7430 million rupees. Out of this a sum of Rs 1940 million was incurred by the R & D units under the public and private sector industries, and Rs. 5490 million by the Central and State Government and autonomous agencies unrelated to production. The expenditure by the private sector on R & D as per cent of the aggregate national R & D expenditure was only 14 in that year; 90 per cent of the expenditure of the government agencies was contributed by the Central Government and the remaining 10 per cent by the State Governments together.

Most significantly, 69 out of the 90 per cent of the expenditure by the government was spent for meeting the expenditure needs of the major scientific agencies like the CSIR, DAE, ICAR etc. The remaining sum

12. Annual Report of the Department of Science and Technology, 1981-82; p 3 : Government of India.

13. Department of Science and Technology; Research and Development Statistics, 1980-81; Government of India, New Delhi.

was spent for meeting the expenditure needs of scientific establishments under different ministries. Manpower-wise picture of the distribution of scientific and technical persons by scientific establishment is also equally significant. About 23 thousand natural scientists were employed in R and D activities in 1980-81; and only 4 thousand out of that were employed in private sector establishments. In the same year 26 thousand engineers were employed in R and D activities; and 7 thousand out of that were employed in private industries for R & D activities.

In 1980-81, the expenditure on R and D by the Central Government was about 5453 million rupees. 937 million, which is about 16 per cent of the total was spent on promotion of industrial development; another 16-17 per cent was spent on development of Agriculture, Forestry etc. The expenditure shown towards promotion of industrial development was used for meeting primarily the expenses of the research establishments under the CSIR. Thus, only the part spent on the development of agriculture, forestry, fishing etc. was marked for direct improvement of an area of production.

The bulk of expenditure on R & D by the Central Government was made towards development of transport, communication, energy, exploration of earth, sea, atmosphere and space. Results of researches in these areas do not contribute to the improvement of production technology (process-wise) directly, but only through improvement of infrastructural environment for adoption of advanced production technologies in economic establishment.

In USA and UK also the direct research involvement of the Government is confirmed to these areas primarily. But whereas in USA and UK researches by the Government is conducted extra-murally, i.e. through other agencies and particularly through industrial establishments, these researches in India is intra-mural. In the former form the government expenditure not only helps the development of research facilities extensively but also feeds and sustains the attitude towards technological development which those societies have formed over the years.

In the USSR the Government directly participates in both industrial and infrastructural R & D activities in massive scale. This involvement is expressed in the very large percentage of GNP spent on R.& D. activities in that country. The part of the industrial research activity in that country is conducted wholly as an element of industrial production and planning activity in which the activity-specific research establishments and the production establishments are corporately associated in an organic manner.

Extreme concentration of intra-mural research in India has added an addition dimension in the technology—economy nexus. In the USA the government, the private industries and the academic institutions have developed among themselves an interdependent structure where each have contributed to the growth of the other, and ultimately of the society at large. In a way, the USSR has also achieved such a synthesis.

In the UK the academic institutions have been separated and only the Government and the industry have formed a platform for working together in the application of science and technology to economic development process. This should be one of the reasons for the relative backwardness of British technological level compared to USA and USSR.

In India on the other hand, there are four segments involved in the matter of development of science and technology and its application to economy for development and growth. These are: The Government, the industry, the educational institutions and intra-mural research establishments under the government. Thus the most benefit would be achieved only when all the four segments meet in the one platform; even for a modest benefit, on the other hand, three segments—the Government, the intra-mural research establishments and the industries must stand together in one platform which at the moment they do not.

CHAPTER VIII

SCIENCE, TECHNOLOGY AND ECONOMIC GROWTH*

Production Process and Input of Science and Technology

In the common measures of economic growth adopted in our country production of both goods and services is taken into account. The use of the component of services in the measurement of the growth of income and output is a more recent phenomenon. In Adam Smith, a distinction was made between productive labour and unproductive labour which more or less distinguished production of goods from production of services. Adam Smith's focus of the economic analysis was accumulation and in that context the output of services which cannot be accumulated had no relevance. With the rise of neo-classifical ideas[1] in economics the focus of economic analysis drastically changed. In this frame it became difficult to distinguish production of goods from production of services.

Ideas of accumulation contained in Adam Smith, which initially started the progressive enthusiasm of the liberalism, however, led to visions of stagnation of the competitive economic system in the hand of later classical economists. Thus, liberal economics abandoned the investigation of the aspects of growth, and initiated investigation of the circumstances leading to improvement of social happiness. In this matter the hedonistic ideas popularised by Bentham and Mill became the starting point for the analysis.

In the hedonistic calculus acquisition of satisfaction and happiness

*Presented in a National Seminar on Science, Technology and Industrial Development; organised by Centre for Research in Rural and Industrial Development; Chandigarh, March 1987.

1. In England the beginning was made by bringing in the concept of utility in economic calculus by Jevons.

became the principal end of individual's endeavours, a measure of which was *the sacrifices individuals were prepared to make for acquiring the bits of satisfaction. As men are known to make sacrifice for acquiring either goods or services these were not distinguished. Thus in the* computation of the extent of economic growth also methods were found for combining output of goods and services for developing a common measure.[2]

Structurally, the activities, leading to production of goods and of services are different. The production of goods involves processing of raw materials, and therefore, in the increase of output of goods per unit of time the idea of increase in the use of raw materials became involved. Secondly, since growth is measurable in terms of quantities of output per unit of time the element of processing capacities of the individual workers invariably enters in the analysis of growth. This capacity brings out how much input individuals are capable of processing per unit of time. As in most cases of production of physical goods a relation between the physical output and physical input is liable to remain constant, the aspect of individual's processing capacity acquires a much greater significance in the affairs of growth.

In the production of services, on the other hand, the individual himself is the input. With all his qualities, therefore, the quantity of services that he can render is proportional to the amount of time he devotes to generating the services. Thus, in the context of an individual, and given the amount of time he is capable of working during a day, there is no issue of growth. In the context of a country, it follows that the growth in the quantity of services is merely dependent on the growth in the number of persons providing services in the society during the given period of time.

This distinction between the production of goods and services, and, in particular, the distinction between the circumstances of their production is important for understanding the role of science and technology in the economic growth process. In the area of production of physical goods the categories associated with growth are the quantities of raw materials which are processed and the capacity of the individuals for turning out raw materials through avoidance of wastages, the essential factor of growth is thus the capacity of the individuals. It also follows that the contribution of science and technology and of technical and professional manpower in economic growth will have to be seen in the context of its contribution to improving the capacities of the individuals to process goods per unit of time.

2. The income earned by the persons employed in providing services was included in national product.

A similar role for science and technology, however, cannot be found in respect of the production of services. This consideration excludes many activities of the society which are put under the service sector in the modern days; for example, the hotels, laundry, hospitals, transportation, water, power and sewerage, etc. For all these activities a measurable physical output and a measurable physical input are identifiable so that in regard to the output of these activities capacity for processing inputs per unit of time is also identifiable in concrete terms. Thus in their regard, the factors of growth can be separated as in the case of production of physical goods.

In most cases many techniques are available for a given processing activity. The alternatives are also not given, new techniques can always be developed for a given processing activity. This can be illustrated with reference to an activity of carrying bricks from one point to another. In the simplest technology, an individual can take one brick at a time, deliver it at the destination and return therefrom for carrying another. If it takes thirty minutes for a to and fro journey, the productivity of the individual is two bricks per hour. As an alternative, a basket can be used that can hold ten bricks, all of which can be carried as head-load without affecting the journey time. In this case the productivity increases to 20 bricks per hour. Other alternatives, like using a push cart without wheels, or with wheels of various sorts, automated cart with various speeds and capacities etc. can also be formed leading to different productivity coefficients.

Theoretically, there is no limit to the number of alternatives that can be developed for a given form of processing. Thus in a complex production activity there can literally exist hundreds and thousands of alternatives, taking account of all the process involved. As the productivity coefficients vary with each alternative for a given processing activity, for a complex of processes different rates of flow of input and output, would emerge, depending on the choices of alternatives for the different processings. The degree of utilization of fixed resources, like machines, and labour, could also vary with each rate of flow of input and output. In a significant way, therefore, the aggregate productivity of labour in an organisation would also vary with the choice of alternatives and of the complex of fixed resources.

Process and Problems of Technological Development in Economic Establishments

Technological development for any society is usually believed to have two components - innovation and diffusion. The classification is too simplistic, and being that, the processes associated with technological development are never fully appreciated. Economists link invention with innovation, and assume innovation to be the application of an invention for economic exploitation. With this, innovation and diffusion are conceived as dependent on economic consideration, and amenable to analysis in economic framework. The aspect of invention is then left as act of genius and result of scientific and artistic impulses of man, independent of economic motivation.

For one who is entering into a business for the first time, the issues are simple. He can compare investment and return associated with various choices and take a decision. Issues acquire altogether different dimensions in the case of those who are already in business and have made sizeable investments for production of certain types of goods. On the settlement of these issues only, which are not merely economic, but also technological, the decision regarding diffusion will emerge.

A new product might also be developed by an enterprise through its own research and development activities. In these cases, both the technical feasibility and the compatibility are tested with reference to the facilities available with the establishment. But as the sub-systems are differently laid out in the establishments, depending on their respective lines of production, such products, though technically feasible might turn out as incompatible with facility structure in many establishments. In such cases, there would be difficulty in the adoption of new products by other establishments. It is for this reason that defence grant for research and development in the United States, UK and other developed countries is made to the private producers who can be expected ultimately to take responsibility for producing the products.

Forces Inducing Technological Improvement

At the time of setting up of an organisation account could be taken initially of the existing alternatives, knowledge regarding which is available, and an optimum mix of facilities, matched with the processing alternatives might be formed. Such a mix could be only an optimum, and would, therefore, leave a degree of underutilization of the fixed facilities.

Productivity, at that level of utilization is also optimal aggregatively.

Further improvement is, however, always possible, but that would depend on improvement of processing techniques primarily. Such improvements would amount to increasing the alternatives. These additional alternatives allow a change in the optimal path. It also follows that other things, like the ability, skill and attitude of the workmen, remaining the same or remaining consistent with the technique and environment of production, the improvement of productivity is purely a technological affair, within the framework of particular productive activities.

On the other hand, as the optimal technology path for almost all establishments, leaves a degree of underutilization of fixed facilities, there is always scope for improving productivity,[3] and the pressure for this arises internally. It also follows that the scope for improvement lies in these cases only in improvement of technology, and not in the least in the improvement of managerial methodologies. There is also evidence to show that technological innovations occur most rapidly in the establishments when the rate of utilization of the fixed facilities is around 70 per cent.

Mansfield estimated for some industries at what level of capacity utilization the maximum rate of innovation could be expected on the basis of given information. For steel it was 67 per cent, for petroleum 73 per cent and for coal 75 per cent (Industrial Research, p.117).

The evidences also bear out that technological improvement which have potentials for raising productivity of labour in the establishments are essentially internal matters of the industry. Moreover, it is also evident that technological development, carried out within the industrial framework alone, have significance for the issue of productivity of labour. Developments carried out at this plane maintain their identification with individual processes and thus become cases for adoption within the overall framework of production in the establishments.

The National Science Foundation of the United States provides data on the amount of expenditure on Research and Development made in the United States annually. It is observed from this data that about 85 per cent of the total expenditure on research and development in the United States is made by the Federal Government agencies and the industry. These are the points where the expenditure is made, and are not the

3. In cases where optimal path does not leave excess capacity, the scope for productivity improvement still exists, but the pressure in such cases comes from outside competition.

sources of fund. This establishes the high degree of association between the point of activity and the point where research for development of activities occur. In a significant way, this data also provide the basis for appreciating the significant technological development of the United States economy after the second world war. The expenditure on research and development at the universities has been around ten per cent in the United States during the corresponding period.

As the development of process technologies is most crucial for economic growth, the knowledge associated with these developments is also the crucial elements in the process of growth. In a way, the relationships between technique of production and the growth of productivity also defines the structure of the knowledge which can be related to economic growth process. Earlier discussions show that such knowledges develop most when their cultivation is carried out within a productive environment.

Problems Associated with Technological Diffusion

The significance of the problems mentioned above is reasonably illustrated by data on patents granted. The data for the United States are available in a paper by Sanden—Some Difficulties in Measuring Inventive Activities, published in Rate and Direction of Inventive Activities, Princeton University. In 1901, patents taken by individuals formed 82 per cent of the total patents granted. The remaining patents were taken by companies. In 1957 the patents taken by individuals formed 36 per cent and by companies 42 per cent. The 1957 records over state the contribution by the individuals significantly. Over the years, practice developed in the United States, among the companies, of developing process and products and of applying them without taking patents. Thus the number of patents taken by the companies in 1957 does not bring out fully the extent of developments by the companies. It has been suggested in a paper by Kuznets (Problem of Definition and Measurement in Rate and Direction of Inventive Activities) that the failure of the number of patents issued in USA to rise significantly since 1970 might be due to an increasing volume of inventions for which no patent was sought. This hypothesis gains some support from the increasing proportion of patents assigned to firms.

The second is the case of the appearance of a new machine which can be introduced in a firm for improving the productive efficiency without disturbing product configuration. Even this introduction might not be so

easy in all cases. For example, an existing railway organisation might find it difficult to adopt a high-powered diesel railway engine in replacement of steam engine or even a low-powered diesel engine. The track system, the signal network etc. might be incompatible with the uses of the new engine according to the capacity for which it is designed. The engine may have capacities for moving large number of wagons and thus carrying more load, but the rail gradients *might make it impossible to* haul large number of wagons. Similarly movement at high speed with such an engine might not be possible due to inadequacy of the track and the signal system. In such cases, the adoption of the new engine by a given organisation might become difficult. The same consideration applies to procuring automobile trucks with large capacities when the existing road system is incompatible with the new vehicles.

Absorption of cases of development of new process or technique for production of a given product in an existing establishment raises all the above issues in much more magnified form. These developments are mostly adopted by new establishments, as in these cases the weight of the sub-system is not present whereas sub-systems can be developed which can be compatible with the process and the technique. In the similar way, the development of a product and process for producing the product is most readily applicable when issues of establishing new production facilities are in the forefront.

It follows that there are inherent difficulties in technological diffusion. The study by Mansfield, referred earlier contain data showing the length of time it took in United States for adoption of development by all the farms in a few industries. It was found out that it took 20 years or more for all major firms to install centralized traffic control, car retarder, by-product coke oven and continuous annealing (page 136). The small and medium establishments were excluded from the analysis. With the inclusion of these firms, evidence of 100 per cent absorption might never have been obtained. The cases of absorption included in the study also covers cases of absorption of the development not in replacement of an previous process but for initiating a line of activity (opening a new enterprise or a new branch of an enterprise in the process of diversification).

Indian Approach to Technological Development

India has evidently chosen diffusion as the only method for bringing about technological development. There is no doubt that initially after

the country acquired freedom, adoption of such a method could not be avoided. The range of output the country used to produce before independence and the range of output which it undertook to produce as a part of its development process were widely different. Therefore, at one stage contracts for installation of factories on a turn-key basis so that production may start forthwith were awarded generously. These factories were set up for producing varieties of machinery and equipment and basic metals which were necessary for building a base for multiplication in future in a rapid way.

Subsequent stages of development in this country have been pushed through, by what can be called technology transfers from the developed countries. Concretely, this has involved buying from established manufacturers of different types of products the methods and processes for such production. In most cases, the knowledge has been obtained by allowing Indian manufacturers to enter into collaboration agreements with the appropriate foreign manufacturers. The collaboration agreements sometimes involved merely transfer of knowledge, and in some cases it also allowed use of the brand names of the products turned out by the foreign collaborator.

In many cases, it was also permitted to appoint foreign firm or a technical group as a consultant for purpose of obtaining the essential technical know-how involved in production of goods. In all these cases, attempts were made either by the national collaborator or by the Government to ensure that the technology associated with certain processes or production is transferred in such a manner that production in the country can be conducted in the manner in which it is undertaken by the parent concern.

Two types of collaboration have been usually sought. In one case Indian manufacturers, involved in a given line of production and possessing appropriate facilities for that, have sought the know-how for production of a commodity which is not currently being produced but is feasible with the facilities. This type of collaborations have been entered mostly by electrical and mechanical engineering firms and the collaborations have been used for diversifying the product lines as also for producing domestically machinery and equipment which were imported earlier. In this way attempts were made to reduce the burden of imports of the country.

In the other case, collaborations were entered for establishing total processing facilities for acquiring capacity for producing a variety of goods. Since any given processing facility is optimal only with respect to

a given complex of goods such collaboration was also effectively a diversification of the type mentioned above, at a national plane. The knowledge associated with this type of collaboration involves additionally the details about the machines and other requirements for producing the commodities. Products and commodities which were subjects for these collaboration agreements, were also those, production of which within the country could be expected to reduce burden of import.

The consultants and the collaborators were expected to ensure that the system and organisation established on the basis of the advice and guidance were effective as in the mother environment. Thus it involved a transfer of a complete technology for production of a given set of products. In a way it was again a turn-key arrangement of the earlier sort, without involving in all cases transfer of physical machinery. In cases where, however, the appropriate machinery and equipment were not available in the country the foreign collaborators were required to provide machinery and equipment either as a part of their contribution to the collaboration agreement or in other forms.

Commonsensewise the two steps-turn-key arrangements and consultancy/collaboration—adopted in the country should appear most natural and effective. It made possible beginning of production of a variety of goods in the society which in the past did not produce commodities in modern technological environment. The initial transplant of factories through turn- key arrangement could be expected to provide opportunities to the craftsmen and engineers to obtain familiarity with the modern production systems. It could also be expected that the output of these establishments would be able to support the expansion of production capacities which were to follow subsequently.

All the establishments set up in India either in turn-key arrangement or with collaboration of any form bear stamps of technological levels of the time of installation, and are turned to producing given complex of commodities, in which regard the total arrangements are optimal. At the time of its installation each establishment could be technologically most modern with a level of productivity per unit of labour comparable to the levels for respectively similar establishments in other countries. At that stage the products of the establishments could also be competitive with the products of similar establishments, within or outside the country.

An Inevitable Consequence of the Indian Approach

The advantage of technical sophistication of the time will, however, be lost quickly, particularly if the product happens to be a heavy machine or equipment. A machine or equipment would be designed and produced largely keeping regard of the employment of that machine in the manufacturing of another product, say X, in a particular environment where the machine can be accommodated. The machine is designed keeping the particular environment in view. So long as the particular environment for manufacture of X prevails the demand for the output of the particular machine will also persist. As a matter of fact, the factory for production of the machine would have been set up only with the expectation that in future factories with given environment for production of X would be set up regularly.

Future facilities for production of X will be created, on the other hand, in future. At that stage, the most modern technology and the corresponding environment, might be different from the previous technology and the environment. In all probability, therefore, collaboration agreement with one of those establishments which are operating the most advanced technology in the production of X will be entered for setting up the factory. Even if an independent consultant is employed, he would also advise the adoption of such a technology rather than the past one. There is also a probability that in these circumstances, the machine suitable for the previous environment will no longer be appropriate. Aggregatively, therefore, the competitive advantage enjoyed by the producers at the initial period will be progressively lost, leading to decreasing profitability.

The progressive decline of the advantages of the establishments is wholly associated with the selection of diffusion as the method for technological development in the country. The diffusion is the cause for bringing an advanced technology, and is also the cause for destroying the advantage which it bestowed at one stage.

The decline is also inevitable. In the simpliest case, the new environment might require a slight adjustment in the design of the machine in current production for installation and erection. Such changes would not only add to the cost, but also might affect the normal production scheduling of the establishment, leading to break-down of the optimal relations of the past. Changes of other sorts might also be involved; for example, disproportionate change in power rating and size dimension might be insisted in the new environment for meeting which

wide scale changes in the production structure might be needed. Thus we find that the Heavy Engineering Corporation set up for meeting requirements of heavy machinery in the country, has entered into a very dismal state.

These possibilities have become so real that the government has allowed a ten per cent price advantage to Indian producers in any global tender. But even with this advantage very rarely the Indian manufacturers are capable of selling their products in competition with foreign manufacturers who not only pay higher wages to their people but also bear a huge transport and handling cost for delivery in India.

Technology Export and Export of Machinery

It is easy to realize why a foreign manufacturer has advantage over an Indian manufacturer in the supply of a given machine needed for installation in India. The process technology selected for manufacturer of X has been developed in country keeping regard of the technological developments in all direction which are relevant for the manufacturer of X in that country. Thus the machinery (with all its specifications) which enter into the latest technology for the manufacture of X are those which are in current production schedule in their respective manufacturing houses under optimal relations and thus are relatively cheap. Because of the above only the new technology developed for manufacture of X could be superior to the previous technology for manufacture of X. Thus in the country from which the technology for X has been obtained, there are also manufacturers who can supply the appropriate machinery, produced under optimal conditions, and, therefore, at low costs.

The collaborator, or the consultant, who provides guidance in the setting up of the new technology for the manufacture of X is also required to provide advice regarding the machinery (with all its specification) needed for such purposes. Necessarily, therefore, he would also indicate the names of the manufacturer of the machinery whose output could be most appropriate for the technology for X. The company which is buying the technology for X would also prefer only those products which are recommended by its advisers, as otherwise total compatibility, and corresponding optimality, could be lost. The company would also insist on the delivery of the machinery as early as possible so that the installation of the new technology for the production of X might not be delayed. In all these respects, a set of foreign manufacturers have advantage; they could deliver the machinery quickly; their machinery

could be totally compatible; and their cost could be the least. These advantages are genuine and the manufacturers do not require any favour from the consultants or collaborators for seeing their products.

These advantages are also so much so that a price benefit of ten per cent allowed to the Indian manufacturers of machinery does not neutralize it. In particular, the requirement of delivery within a fixed time, puts tremendous pressure on the cost of the product in an Indian factory which is not optimally set for producing the product. Sometime can be gained by off- loading and by procuring finished intermediate products. But as the manufacture of those items outside (but in India) is not carried out in the technologically most appropriate manner (as it is possibly done in the country from which the technology for X has been obtained) the prices of those products are higher in relation to the price of the finished machine, and therefore, uneconomic in cases where these intermediate products have to be purchased. But as the manufacture of those items outside (but in India) is not carried out in the technologically most appropriate manner (as it is possibly done in the country from which the technology for X has been obtained) the prices of those products are higher in relation to the price of the finished machine, and therefore, uneconomic. In cases where these intermediate products do not form part of the standard production schedule of the respective suppliers, as in the case of non-standard castings, the prices quoted by the suppliers could be all the more uneconomic.

Indian manufacturers of machinery have tried to overcome these difficulties by entering into collaboration with the foreign manufacturers whose products meet the specification of the Indian buyers while quoting in a tender. Through the collaboration agreement they obtain from the foreign manufacturer the drawings and production schedules for manufacture of the particular machines. In such cases the foreign manufacturers realize the profit, which they could obtain by supplying the materials directly, in the form of consultancy fees.

Economic Effect of Technology Import

In other words, initial collaboration in one area opens up needs for collaboration in many other areas and it is through this type of arrangements that the industrial development in this country is occurring. Whenever an establishment is started in the country a collaboration is entered with a foreign house for obtaining the latest technology in the particular area. Such a collaboration automatically opens up needs for

other collaborations, as otherwise, with the existing arrangement the needs of the new establishments can not be met. It also follows that as the needs for meeting the requirements of new establishments which incorporate the latest technology can not be met with the existing facilities, mounting pressure for establishing new ventures under the plan programmes only creates excess capacity in the existing plants, and recurring losses in them. This is also the most significant reason from the engineering side for the rising capital-output ratio in India. The reason is pervasive, for any establishment set up to day is bound to develop excess capacity within a short time in these circumstances. It happens for no other reason than that the products with their own specifications for which the establishments are optimal would not meet the future needs which will be based on future technological environment.

The conditions are similar also in respect of intermediate products. An integrated iron and steel mill is set up optimally in relation to such as the chemical composition of the basic elements, physical dimensions of the products and the processing features like hot press/rolling and cold press/rolling. The output of these process is usuable as intermediate products for manufacture of other products like structurals, machinery, body plates for ship, tank, wagons etc. At the time when the steel mill is established the structure of its products is made compatible with the technology in use at that moment in the processes in which the steel products will enter. With the passage of time, new establishments using steel products as essential input will emerge, and most of these will ask for steel of different specifications (physically and chemically) from the ones in relation to which the existing steel plants were set up. Thus demand for steel will increase along with excess capacity in the existing steel plants. *In respect of almost all intermediate products such situation will prevail.*

The Nature of Technology Transfer and the Associated Issues

Two types of transfers have occurred. In one, a complete technology, starting from the guidance about the engineering facilities to be created for manufacturing a commodity or a group of commodities, and ending in production schedules, drawings and designs, tooling features, testing and quality assurance features for the manufacture of the products is delivered. Under such programmes of transfer, the details about the machinery, layout, erection and installation features, civil works, material handling, utility structure like supply of water and electricity,

drainage, maintenance schedule etc. are provided. The collaborators also participate in setting up the organisation in physical sense. Together with these, the collaborator also provides the methodology for using the facilities for turning out the products. In this regard the details about the materials to be used, the drawings and designs, production schedule including guidance about the machine to be used for various jobs and the tool features etc. are passed, on. The collaborator also undertakes training of the manpower so that the output in real sense can start flowing.

Most of the establishments in India after independence have been set up under these arrangements. With such arrangement, each establishment is set up, incorporating the most advanced technology prevalent in the world. The transfer is complete and is, therefore, very rigorous and leaves very little flexibility in the hand of the Indian collaborator. The foreign collaborator also specifies the types of manpower needed for operating the technology, including the size in each category. The type and specification of all the machinery are laid down in detail, and as their physical features are fixed with each other and with the utility structure, flexibility in this regard also is not available.

A second type of collaboration is entered for obtaining knowledge about the method for producing given products. These collaborations are entered by existing establishments which have reasonable facilities for diversifying the product lines so as to meet the demands of the time. In this case, drawings and designs, tool features, production schedules, quality assurance features, input specifications etc. are transferred. Such collaborations are entered essentially for acquiring capacity for producing a product for which a demand has been made. In general, these collaborations are tied to the demands which arise from collaborations of the type mentioned above. In the heavy and light engineering area—mechanical, electrical and electronic—collaborations of this type are most prevalent, and are entered regularly, and take care of a part of the demands which arise from new investments. These collaborations are usually entered so as to be able to supply the products according to the time schedule framed by a buyer.

There are significant consequences of these arrangements. Demand for machinery and equipment is dependent on the type of technology being adopted for setting up new establishments for producing products. The technology associated with the production of a product in any country is in tune with the machinery and equipment manufactured in that country generally. Therefore, the country which sells the technology for a product to another country has an initial advantage in the supplies of

machinery and equipment. Moreover, the country which imports the technology could not have been producing the machinery and equipment associated with the technology being imported. Thus the countries which are the exporters of technology are also usually the exporters of machinery and equipment. In effect, the international trading in engineering products is built around export of technology, with the developed countries which sell the technology monopolizing the export of machinery and equipment also. Thus one observes that not only that the trade in engineering products is rising steadily but also that the share of the developed countries in the trade of engineering products is rising.

Technology transfer is not confined to movement from developed to underdeveloped countries. Lot of technology exchange occurs among the developed countries also, in particular through the operations of multinational corporations. Technology transfer also occurs for serving critical needs of different societies, and this has acquired significance these days from defence considerations. Thus trading in engineering products among the developed countries has also acquired great significance, so much so that it's growth has been larger than the growth in the trade of these products between developed and developing countries.

The position for the countries, like India, importing technology is just the reverse. Notwithstanding the continuous expansion and diversification of engineering activities in India through technology transfer from developed countries the export of engineering products from India has not shared the growth of trade in engineering goods in the world. In fact, the share of Indian export in the global export of engineering goods has been falling steadily. On the other hand, the import of machinery and equipment in India has been rising faster than the export of these products.

Conclusion

Two things have been brought out in the above discussions. The first is that the economic structure of the pre-independence days has been preserved even after the independence of the country. The country has remained dependant on import of technical knowledge and machinery for almost all lines of industrial production. Moreover, the intensity of dependence has increased significantly, and has been proportional to the expansion and diversification of the industrial segment. The expansion and diversification did not improve, in the least, the capacity of the

economy to sell abroad the industrial products, whereas imports of the industrial products themselves increased significantly for sustaining the expansion and diversification of the industrial segment. Thus, as a result, the dependence on the export of primary products, including nonrenewal resources, like ores and minerals, have increased. This has consolidated the colonial structure of the economy. On the other hand, rigid controls on imports of consumer products have been imposed. The controls have allowed in particular, inefficient units in the consumer good sector to prosper This has also sustained the inefficient producers of standard industrial inputs and small machinery and equipment.

The second is that during the entire period no attempt has been made to develop the institutions which allow the exercise of growth-inducing faculties of manpower. It has been believed wrongly instead that a late starter in the industrial development programme can always benefit from the knowledge developed elsewhere and avoid the efforts and expenditure associated with research and development. For forty years the country acted with this belief, and the result of this has been described in detail in the earlier pages. In any case the result has not been worthwhile.

The growth in the currently developed countries, societies has been built wholly on the capabilities of manpower and on the institutional framework for appropriate development and utilization of human resources. The institutional framework has been perfected over the years and has made possible a continuous improvement of productive efficiency of workers in all industrial activities. In the process, a separate activity of technological development, with formally educated manpower in employment, has emerged as a part of the regular industrial activity in those societies.

The productive efficiency in those societies has been increased by developing improved process—technologies, new products, improved machinery, new machinery and equipment etc. These products not only improved the productive efficiency in the establishments but also, being products themselves, diversified industrial activity and raised the level of industrial production, trade and employment.

In a significant way, our import of machinery and technical know-how has contributed to the growth of activities and of employment of formally educated persons in those societies. On the other hand, since we did not undertake developmental activities in our country, growth of employment in our society has been confined to production process operators, including their supervisions, alone. Thus our engineers have better prospects abroad than in India.

CHAPTER IX

TECHNOLOGY IMPORT AND SELF-RELIANCE : THE INDIAN CASE*

Introduction

Economic development and removal of the utter state of poverty to which this nation has been subject for ages have been an essential objective of the Indian freedom movement. Indian poverty was attributed to the colonial structure of the economy which allowed on the one hand a steady drain of its resources and restricted, on the other, growth of domestic economic activities with higher production potentials. Vigorous policies were initiated immediately after independence for removing both the obstacles and for acquiring in consequence a self-reliant economy.

This paper is devoted to examining the policies and its theoretical roots and to finding out the extent of self-reliance acquired through the efforts made. The Indian concept of self-reliance covered not merely the aspect of external dependence but also that of internal economic growth. These were combined so that the basic objective of removal of poverty could not be subordinated to the objective of freeing the economy from controls of other nations. In this form the programme for achieving self-reliance has become tied with the programme for economic development. Thus the evaluation towards all aspects of the economy.

The core of the Indian approach has been a vigorous import of technology coupled with a high rate of domestic investment. Such an approach was expected to build up a large stock of capital with a high level of labour productivity as quickly as possible so that not only the poverty is removed but also a foundation is laid for sustaining a highly productive economy in the future.

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This paper examines the benefit of such a policy reaped by the Indian economy during the last forty years. In the matter of international exchanges, India, with such a policy has become neither a fully protected, nor an open, economy. The policy itself has defined the extent of trading exchanges the country should indulge in; and the trade has correspondingly, fashioned itself as a part of the policy. This paper has, thus, gone into an investigation also of the benefit/loss suffered by the other countries which became associated with India in its march towards development

Concept of Self-Reliance

Situation at the Time of Independence : Before independence Indian and foreign capital operated in India and the areas of activities were generally separated. Indian capital was largely employed in the production of textile sugar, paper and cement and steel. The British capital was employed in plantation, mining and engineering. The Second World War provided opportunities for the Indian capital to expand and diversify in a significant way. The industries controlled by Indians expanded in consequence—cotton by fifth, steel by two-fifth, cement and paper doubled during this period. Many other activities also developed under Indian control—ferro-alloys, non-ferrous metals, diesel engines, machine tools, sewing machines and few items of tea, textile and oil-processing machinery, railway equipment and so on.

Foreign capital started leaving India after the financial crisis of 1931. The repatriation grew in volume during and immediately after the Second World War. The foreign-owned companies were taken over by the Indian capitalist and slowly the control of the Indian capitalist started dominating the Indian economy.

The changeover became very fast after the country obtained independence. The changeover, however, did not materially affect the structure of the Indian industries. The capital good sector which was very inadequately developed before the independence continued to be so for quite sometime after the independence. Thus, the major emphasis in the Indian planning process from the very beginning was put on the development of capital good sector so that a balanced structure of the Indian economy could be established as quickly as possible. It was, however, appreciated that development of a capital good sector from a void could not be undertaken without obtaining machinery and equipment and technical knowhow from the developed countries which

possessed a developed capital good sector.

The capital good sector were expected to turnout adequate quantities of machinery and equipment which could provide support for expansion of economic activities in all directions. For building up factories which could produce machinery and equipment need was again felt for factories which could produce machinery for production of other machinery.

It was, therefore, felt that so long as basic facilities were not developed, i.e., so long as the country's output of machinery and equipment was not sufficient for supporting growth of activities on all sides, the country could not be expected to acquire economically independent status. Alternatively, it was also felt that so long as a balanced structure was not set up, the country would remain dependent on other countries, in which case the freedom acquired politically could have very little significance.

Emergence of the Concept of Self-reliance : The idea of self-reliance was not mooted during the first two Five Year Plans in explicit manner, although, the essential parameters which determined the extent of economic independence of the country had started crystallizing. In particular, the issue of self- reliance in the economic front was understood to be associated with imports of machinery and equipment for sustaining expansion of domestic activities. Mahalonobis, who provided the basic frame for Indian plans generally and the Second Plan in particular, held explicitly that as the capacity to manufacture both heavy and light machinery increases, the capacity to invest would also increase and India would become more and more independent of import of foreign machinery and capital goods (The approach of operational research to planning in India ; Sankhayya 1955).

Vigorous programme of industrial development, and particularly development of capital good sector was initiated during the second plan. The extent of dependence of the economy on other countries also became immediately evident from the pressure the programme of development imposed on the foreign exchange situation. Before the end of the second five year plan the country faced a huge foreign exchange problem leading to considerable slackening in the tempo of development. The foreign exchange problem also brought into focus the crucial relationship between self-reliance and balance of payment position.

The third plan for the first time highlighted the role of external assistance for building up a self-reliant economy during critical period of transition. Implicitly, it was held that the need for external assistance

could be avoided when a self-reliant economy which could also sustain a high rate of growth was formed. In subsequent plan documents the idea of self- reliance was made explicit and it was stated that self-reliance involved freedom from dependence on foreign aid. It also added that self-reliance involved establishment of acceptable minimum standard of living for the masses and continuing rise in this standard. In concrete terms, it stipulated an export surplus sufficient for meeting (a) interest and repayment commitments, (b) normal imports required for full and effective utilisation of capacity, and (c) imports necessary for facilitating the continued growth of the economy.

In the Fourth Five Year Plan document for the period 1969-74 the stage reaching self-reliance was set for 1978-79. The self-reliance was taken to include in that document (a) internal savings sufficient to finance not only investment but also the payment liabilities on the foreign debt and (b) a foreign trade surplus (inclusive of invisibles) equivalent to atleast the interest payment to foreign aid net of debt serving to half the current level. It also stipulated target for the next plan period as reaching zero net aid position.

Basis of the Concept of Self- Reliance

Basic Theoretical Root : The term self-reliance used in India is based on the ideas of the Indian economists. India started planning for development at a time when discussions on theories of economic growth started in Europe and America following the ideas thrown up by Harrod and Domar. Harrod's initial paper on this aspect was published in 1939 but due to the war in Europe the issues of steady state growth did not find any attention. Domar wrote immediately after the war, (1946) and sometimes afterwards Harrod's book on growth appeared. In effect, the discussions on the theories of growth started from the beginning of fifties. Indian planners grabbed the ideas at this stage and started developing the plan frame keeping close to the Harrod-Domar structure.

In this formulation growth of national income is taken as proportional to investment. The formulation was in terms of national income, as an aggregate concept representing the output of the national effort. The national income is derived from the annual output of various commodities. Thus for concrete planning the programmes relating different types of products were needed. At that stage it was noted that many types of products were not produced in India, that some of those were imported, and that in respect of some the society were going

without. It was felt by the economists that the economic development programme of the country could not be indifferent to such a state of affair. Thus emphasis on creation of facilities through investment for production of all sorts of commodities in the country became a part of the plan.

The operational part of the plan was, therefore, built around programmes for setting up facilities for production of the types of commodities which were not produced in the country. An industrial policy was also developed delineating the spheres of public and private sector in this regard.

The concept of self-reliance was also concretized in the process. The weakness of India was noted as its lack of facilities for producing many types of products, in particular, the needs for which were met by import. A measure of self-sufficiency was also developed in the process. This represented an acquisition of facilities for production of all types of products in needed qualities so that imports could be avoided altogether Thus, in effect, self- reliance came to be linked with imports and balance of payment in India.

In economics, and particularly in the framework of Harrod-Domar type of growth models, which were the basis of Indian planning system, capital, represented generically by equipment and machinery and the necessary civil works, was the crucial factor. It produced output, meant for consumption, as also itself and thus was the source of growth of the economy. In this way, mere creation of facilities for production of all types of machinery and equipment in needed quantities could be considered sufficient for achieving economic self-reliance. At the time of independence almost all types of machinery and equipment were imported, so that with achievement of economic self-reliance, as defined above, India's need for import could be expected to disappear. Thus a regular economic programme was also tied with the concept of self-reliance and its suggested measure. The concept of self-reliance, which evolved thus, also became sufficient for guiding the socio-economic policy in the country.

The programme also appeared feasible. The products under reference, i.e., the desired machinery and equipment, were under regular production in many countries. Thus turn-key contracts could be given to particular agencies of those countries for setting up appropriate factories which turned out those products and for training persons how to operate those factories and produce machinery and equipment. According to the theoretical understanding the machinery and equipment could be

expected to produce all goods including machinery and equipment themselves and, therefore, once a set of such factories is set up, the output of these factories could also be expected to sustain future growth of the economy without imports. In this way, taking advantage of the technical knowledge as also the knowledge of economic principles developed in other countries, this country could be set upon a course of prosperity. The economists also produced estimates of the period the society would take to become a part of the economically developed nations.

Theoretically there was no flaw in the argument. The promises were most tempting and the suggested policies were simple, meaningful and operational; and the ideas were, therefore, immediately accepted. In one sense, the country came to be considered most progressive, in having a policy structure fully in tune with the latest theoretical knowledge in the area of economics. The Indian approach also became a model for all other underdeveloped countries.

Development in Theoretical Ideas and Crystallization of the Concept of Self-reliance : In the course of time, with further development of ideas of growth in the western economic thinking, and with continuous mastery of the Indian economists over the western thinking, the Indian policies in this direction crystallized steadily. In the meantime, the government also established complete control over the economy, so that divergence between policy and practice reduced quickly. Thus the Indian economy became the first and the only country in the world to be managed wholly by the principles of economics. In the process a small modification of the concept and measurement of self-reliance occurred. Instead of focussing on the volume of imports for a measure of self-reliance, emphasis came to be laid on avoidance of concessional credit. In effect, it came to be felt that India could be called self-reliant if only it acquired the capacity to establish balance of payments without surrendering its self-respect, though in the process it might sell all its natural gifts like ores for earning foreign exchange.

The change in the concept arose for accommodating the developments in the theories of growth which occurred during the fifties of this century. The Harrod-Domar system highlighted the interdependence between capital and output, i.e., how each contributed to the other's growth. For a general plan frame, this relationship could be enough, but otherwise it was inadequate in that the manner in which the productivity of labour fare in the process was not implicit in this system. In particular, the Harrod-Domar mechanism was indifferent to the fact that in the western societies

the economic growth remained steadily associated with rising productivity of labour.

Further discussions in this matter brought out the crucial role of what was called technological development in the growth process. It was also suggested in the discussion that the technological knowledge possessed by individuals has a tendency to be embodied in the machinery and equipment so that the machinery and equipment produced in any year (with embodiment of current knowledge) could be expected to be more efficient that the machinery and equipment produced in earlier years when the knowledge was not very advanced. As the stock of capital in any society, and particularly in the western society, has been formed by accumulation of equipment and machinery of different vintages it will also follow that the aggregate efficiency of the stock will necessarily rise faster than the growth of the stock. This will happen because the additions to stock in any year will embody a higher quantity of knowledge than the knowledge embodied in the other elements of the stock. In the context of the developed societies, these suggestions answered the fact of steady growth of labour productivity.

In the Indian context these suggestions opened up many more alternatives for the policy frame. It opened up, in particular, the idea of the possibility of raising labour productivity in India through absorption of latest varieties of equipment and machinery produced in the west. Such imports could then be expected to ensure not merely rapid development of facilities for producing different types of products but also transfer of knowledge developed in the west for enrichment of the Indian society.

In the Indian policy statements reference to import of machinery and equipment was not explicit in as much as there was emphasis on import of technology and knowledge. In any case, the possibilities of regular imports of goods as complements of import of knowledge were admitted. It was, however felt that with expansion and diversification of the economy export possibilities would also improve so that in future need for concessional credit would be avoided.

Anachrony in the Structure of Ideas

Self-reliance by Increasing Dependence: The model developed by the Indian economists has been remarkable. It provided for development of structure of production facilities which would be self-sustaining in all regards. It also provided for levels of productivities that would be comparable to the levels in developed societies. Most importantly, the

needs of continuous improvement of productivity were also taken care of so that the country could maintain its position among the developed countries.

The model also provided for the achievement of these, i.e., self-reliance, in the quickest time, drawing upon the knowledge developed every where in the world and without allowing the previous state of underdevelopment to act as a hindrance in the process of readjustment. In a way, the entire programme could be said to lead to completing the process of achieving independence for this society in the most comprehensive significance.

There has been, however, an implicit conceptual rub in the whole thinking. The model and the programmes for acquiring self-reliance depend totally on support from outside. The economic ideas which provided the rationale for the entire programme originated in the west, and researches there helped in crystallizing the structure of thought. Evidently support in this area was expected to be available regularly. Similarly for building up the structure of production facilities which could be expected to take us to a state of self-reliance, and also for improving progressively the productive abilities of the economic system, the society, according to the programme has to depend on the growth of ideas in the west. Both sort of supports occupied crucial roles in the scheme of events.

It is, however, believed by many that economic ideas are universal, being a part of the global corpus of scientific knowledge, so that the economic knowledge used in the model is as much Indian as it is western. Thus, in the use of this knowledge no issue should arise. The relevant materials were printed in English language which could be read and assimilated by a large number of Indians. Moreover, India has a well-established educational system, and economics taught in the universities cover these and nothing else. Therefore, ideas used in the development of the model and the programme were genuinely Indian. In any case, this claim is more modest than the claims of many, who hold English as an Indian language.

This type of logic does not apply to the case of support in respect of technological knowledge. The knowledge in this area is not in the least universal. There is no access to this knowledge in general.The knowledge is developed specifically and every bit of it has to be purchased. In some cases, it might not be available in the market at all. For example, USA does not allow sale of technology for defence and defence related products. In many cases export of certain products, technology relating to

which are liable to be revealed in the product itself, is banned by different countries. Thus the dependence on technological knowledge, implied in the programme of Indian development was real; the dependence was also crucial in that the success of the entire programme was dependent on our ability to benefit by the growth or knowledge in the technological areas in the developed countries.

Period of Dependence Unspecified: The Indian programme of development, and the goal of self-reliance which the programme was expected to lead to did not visualize any end to the dependence on technology import. Instead, it was happily believed that it was a privilege of intelligent nations and late comers in the industrial world to exploit the knowledge developed elsewhere for growth, rather than go through the whole process of research and development over again. Thus the number of collaboration agreements for import of technology and the import of machinery and equipment embodying the recent advances of knowledge in the developed countries increased steadily over the years.

The anachrony in the structure of the model is evident. A programme for acquiring self-reliance has been built on continuous and increasing dependence on external factors. The extent of dependence should not be underestimated, nor should this be brushed aside on the ground that being only the element of knowledge, the improved programmes of education and training in the country could be expected to take care of the deficiency in the long run. This might be true of the part of economic ideas which went into model building, but would be totally untrue in respect of the part of technological knowledge. The relevant knowlege is out and out product-specific and, therefore, can never be learnt in the colleges which deal with generalization.

In any cases, the economic model builders of India were utterly indifferent to the apparent anachrony in their models and allowed this anachrony to prevail as if a structure of balanced facilities for production of a given complex of products could be sufficient for sustaining future growth and diversification of the economy. It was felt that import of technology would be made only for establishing the balanced facility, and that once such facilities are created a self-sustaining growth could be initiated, at which stage the essential economic parameters like savings and investment rates, capital/output ratios and investment allocation would dominate the future behaviour.

It was understood, however, that though the import of knowledge would no longer be necessary after a self-sustaining stage is reached,

the need for knowledge would still persist. For this reason, as a part of the planning process engineering educational facilities were expanded vigorously, and a number of Institutes of Technologies (IIT) were started for advanced education in the engineering areas.

Indian planning, in a rigorously theoretical framework, started from the middle of 1950's (Second Plan). The economic policies also strictly followed the suggestions of the economic theories, and these were executed vigorously. These policies, as noted earlier, aimed at delivering a state of self-reliance for the society. Thus, whether the anachrony mentioned above was only theoretical, or had real significance, should be reflected in appropriate Indian economic data. In the following section the appropriate data are presented.

How Self-Reliant India has Become

Indirect Evidence : The apologists of the current Indian policy frame usually bring out in support of the claim of success the array of statistics showing the output of products, both in magnitude and variety, in relation to what India used to produce at the time of independence. It is a common knowledge that except for a minor variety of consumer products and machinery, all goods were obtained from abroad.

There are many factories now in the country producing heavy machinery (electrical and mechanical); almost all types of consumer products the variety of which expanded significantly after independence, are produced in the country. A variety of transport equipment, like automobile, railway engines, aeroplanes, ships, meeting both defence and civilian needs is produced in the country. Similarly, sophisticated equipment for communication including computers, heavy chemicals (including petrochemical products) etc. are also produced in India. India has also facilities for atomic power generation and production of space vehicles including launching system. A large part of the defence needs is met by local production. India currently occupies a place among the first ten industrial nations of the world. Thus, with all these, there should not be any question about the claim. Equally imposing are also figures relating to the number of large industrial establishments, size of industrial workers, size of engineers and technologists employed by the economy etc.

The figures are evidently impressive, but in the context of assessment of the extent of self-reliance, the major question is how much reproductive ability this system of productive facilities has acquired. This

can be judged in the following way. In economics, the global reproductive ability is measured by the rate of saving. It is understood that the rate of economic growth is directly proportional to the rate of saving, which is equal to the rate of investment. This is held to be so because the investment also represents the extent of capital formation, i.e., the output of machinery, equipment and other products needed for additional production. The actual reproductive ability, however, is measurable simply as the growth rate registered by the economy. On the other hand, as the investment and the capital formation are the same, the reproductive ability as measured by economists could also be the technically feasible rate. Thus, in a way, the ratio of actual growth rate and the growth rate following from the economic reproductive ability should provide an index of reproductive ability acquired by the productive system.

The stock of capital in India grew, on the average, at the rate of seven per cent per year during the period under consideration. This, therefore, was also the economically feasible rate of growth of income. The actual rate of growth of income, on the other hand, was, on the average, 3.5 per cent per year. Therefore, the reproductive ability acquired by the Indian productive system, notwithstanding, the achievements mentioned above has been only 50 per cent of the feasible ability. From this side, the conclusion is irresistible that the productive system developed during the last 30/35 years has not been self-reliant, in so far as, it could not reproduces at the desirable rate.

There is tendency to attribute the above failure of the economy to inadequacies in the area of implementation of plan programmes. This may not be wholly true. The total productive capacity is spread among thousands of industrial establishments. In general, each establishment is affected by its own parameters. The state plans and programmes also affect the activities of the establishments but not all the time. It is also true that at any instant of time some establishments may be totally dependent on Government, for example, when the licenses are being obtained for expansion, import etc. At the same instant of time, there are also many whose immediate activity is not dependent on the Government. Similarly, at any instant of time there are some establishments which are receiving favour from the Government, and some being obstructed. Thus, on the average, the productivity of the establishments should depend on the internal factors at any instant of time.

More importantly, the reproductive ability of the establishments did not reach the figure of 50 per cent all at once. Initially, the Indian rate of

saving and investment was less than ten per cent, and it increased to the current figure of 23 per cent gradually over the last 30 years. During this period the incremental capital/output ratio increased from about three to six. Thus, there occurred a steady decline in the reproductive ability of the Indian productive system. Such a situation can not be associated only with steady deterioration of the quality of implementation, regarding which however, no definite data are available.

Direct Evidence: Moreover, steady decline in the reproductive ability, with steady expansion and diversification of the industrial system, indicates steady decline in the degree of self-reliance of the society, rather than its increase, as usually inferred from the statistics of industrial output. This is easily read from the direct data on the degree of support received from other countries during the period.

Three types of information are relevant in this context : the collaboration agreements, foreign investment and import of capital and intermediate products for expanding domestic output. In the Indian context these are interlinked in one way or the other. Information-wise, however, these can be analysed independently.

All these are means by which technology and knowledge associated with the production of commodities are obtained. Mere import of goods implies import of knowledge embodied in the good. In the other extreme form, a foreign firm may be allowed to set up a productive unit with the most modern technology, giving the benefit of the knowledge to the receiving country. The intermediate mode is the collaboration agreement (with or without foreign capital participation) in which a domestic unit receives under the agreement the production technology from a foreign manufacturer which has control over the technology. Increase in these areas, therefore, measures increase of dependence of the country on others, and to that extent, a decline in self- reliance. However, it is also arguable that as these increase, the stock of knowledge under the command of the country also increases so that self-reliance increases rather than decreases with increase of the above magnitudes. The Indian policy towards the above three aspects has been built around this supposition.

The anachrony of the supposition has been discussed earlier. Empirically, the supposition has significance provided there is evidence of decline of these magnitudes, absolutely or proportionately, after a reasonable period of time.

In India technical collaboration agreements were mostly without

foreign equity participation. According to a study by the NCAER (Foreign Technology and Investment, New Delhi 1971) out of 2792 arguments entered during 1951-67, 2369 agreements did not involve foreign equity participation. The relationship between collaboration agreement and import of supporting products is more intimate. In some cases, some imports are explicit under the terms of agreements. There are, however, many indirect effects associated with a collaboration agreement and in almost all cases there are reflections of these in the imports. Thus both these aspects—the number of collaboration agreements and the import of machinery and other associated products—are relevant for this analysis.

Detailed information about the collaboration agreements is available in the report of the study by the NCAER (mentioned above). Data are also compiled in this regard by the Indian Investment Centre, New Delhi. According to the latter source the Government of India approved 3191 collaboration agreements during 1957-70. This number increased to more than 10 thousand by 1985. It means that the number of agreements entered per year significantly increased over the years after independence.

The study by NCAER identified the form of service provided under the collaboration agreements. These are : licences, other production know-how, plant construction, pre-investment service, problem solving service, training of personnel, borrowing of experts as Consultants, drawings and specifications, patents. The study also brought out that about 70 per cent of the collaboration agreements involved licence and other production know-how; another 9 per cent involved plant construction. All other services accounted for the remaining 20 per cent agreements.

A licence is defined roughly as an agreement by which the licensor extends to the licencee a limited right to make, use or sell the licensed object, and to that effect also transfers blue prints, designs and drawings for the product including the components manufacturing instructions, layout patterns, process flow charts, engineering flow charts, load diagrams, equipment specifications, details of data processing, testing and quality assurance particulars, materials to be used etc. In some cases the licensor also undertakes to provide technical manpower for guiding initially the work at licencee's end and to train manpower so that the work can proceed smoothly afterwards. From the licensor's point of view licensing is one of the important marketing strategies. This is a means to move products to a market when otherwise heavy transport costs or other

factors make the physical movement of goods difficult or import regulations or sheer market size make the exports impracticable. Keeping regard of these the licensor provides all other needful assistance to the licensee.

Knowledge of the above has been acquired without involving any licence under what has been called acquisition of other production know-how in the NCAER study. About 35 per cent agreements fall in this category. These agreements have been entered particularly in such cases where the final output is indistinguishable from the products of many other companies, while the processing technology and basic inputs are distinguishable, as in chemical including petrochemical and metallurgical industries.

Under these agreements the Indian collaborators virtually turn into agents of the foreign collaborator doing totally as per the guidelines provided by them. Successful agreements are those in which the guidelines are comprehensive. In the Indian collaboration agreements the foreign collaborators do not usually undertake financial responsibilities, so that their returns are only royalties, where as the Indian collaborators earn profit on their investment, and no more. An element of monopoly profit is also associated since the licensor is not expected to issue licence to more than one firm in any country. At the Indian end the activities are strictly according to the guidelines, and the efficiency is related to the capacity to follow the guidelines smoothly. Thus, what is suggested as acquisition of know-how amounts really to acquisition of the capacity to follow the guidelines smoothly.

Aspect of Dependence Usually Highlighted: The aspect of dependence under the collaboration agreements has not been adequately stressed in the past. Both the national and the international agencies have stressed so far only the restrictive parts of the agreement. Among these the tied purchases of imported inputs, equipment and spare parts and restriction of exports have been highlighted. Tied imports could be related to the quality of the finished products for which the licensor has also a responsibility. Seen from this angle, the condition on import need not be wholly restrictive. The export restriction could, however, be harmful. The modern sector in most developing countries is built around establishments which acquired technological know-how through collaboration agreements. Thus restriction of export of the products of this sector will vitally affect these countries, in so far as their dependence on export of primary products for foreign exchange income will increase.

In a way, such restriction would only perpetuate the traditional economic relations and states of underdevelopment.

United Nations conducted a study of the types of restrictions imposed in the collaboration agreements between developed and developing countries (Major issues arising from the transfer of technology to developing countries, New York 1975). It has been found out in the study that 43 per cent agreements entered by India contained clauses restricting export in some way. In about 16 per cent agreement export was not totally prohibited, but was allowed in specified countries.

For India, particularly, the restriction on export has been marginal. Moreover, the export of products in the countries which were permitted under the agreement, has also been marginal. In more than 50 per cent agreements, no restriction was imposed. Very insignificant quantity of products produced under these agreements was actually exported.

Thus the factors on the side of cost which are usually highlighted in the evaluation of projects under collaboration agreements are not very significant. In any case, these do not represent a great deal of dependence on outside agencies for the nation.

Crucial Areas of Dependence : On the other hand, there are many other aspects in these arrangements on which total indifference has been shown. A collaboration agreement for production of a given product involves an Indian and a foreign party, which is almost always the manufacturer of the given product. Thus the agreement has to be beneficial to both parties. From the side of the foreign party the issue is simple. The agreement is undertaken by the original producer for beating the restrictions imposed by different countries on the import of his products. The agreement does not directly remove the hindrance, and does not lead to any physical movement of the product but it does provide the original manufacturer an opportunity to earn the same return per unit of the product as he would have earned by direct export.

The revenue earned by the foreign manufacturer through sale of a unit of its product (either in the domestic market or abroad) covers four elements, (i) direct cost of production, (ii) cost of technical and commercial support to production, (iii) interest on the capital employed in the production, and (iv) return for product development net of cost of development. The direct cost of production represents the material cost and wages/salaries of direct production workers including supervisors. The item (ii) represents the cost for ensuring that the production is carried out according to the production/machining, assembly, fitting and testing

schedules, process schedules, specifications of materials, details drawings and designs etc. developed as part of the product development work. Item (iii) is self- explanatory, and item (iv) represents the return for the product development including the development of the process and production schedules and the other associated routines.

The sale of a product, at the first instance, reimburses the manufacturer the expenses borne initially on the first three items. He earns no profit on these. His profit is wholly in item (iv). He undertakes the responsibility of production and incurrence of expenditure on the first three items merely for earning what is included under item (4).

Under collaboration agreement the responsibility for the first three items is taken by the licensee, who also ensures the original manufacturer appropriate return included under item (4). Thus for the original manufacturer a collaboration agreement under the existing circumstances is an ideal arrangement. The problems associated with export are resolved, botheration and investment associated with direct production are avoided, and yet the desired return per unit of output is ensured.

The return, called royalty, is usually related to the sale of the product in the country where it is manufactured under licence. In order that the production and the sale are not affected for technical reasons, and that the aggregate return is thereby maximised, the foreign collaborator provides most detailed guidelines to the domestic collaborator. Adequate training is also provided to the manpower so that the production can be carried out smoothly according to the guidelines. The guidelines include all the schedules —production/process/machining, assembly, fitting, testing etc. material specifications, detailed drawings and designs, and such other instructions which are necessary for carrying out the production smoothly. The foreign collaborator also takes utmost interest in this matter since his profits is related to the volume of production.

How Dependence is Perpetuated: The claim of the foreign collaborator on a part of the revenue of the domestic collaborator arises from his contribution to the development of the product, whose concrete form is the development of the set of schedules, specifications and drawings and designs. In the global competitive framework each specific product or a process is good only for a limited number of years after which an improved product or process overtakes it. Thus a manufacturer which enters into this business of selling licences survives in the business by being himself in a position to offer at a latter stage improved products

or processes.

Two things are necessary for this. First, it maintains its capacity for developing products/processes and continues to make efforts in this direction. Secondly, it also develops a confidence that the documents and training provided under the terms of the agreement, to the licencee units, on the basis of which they acquire expertise for turning out the licensed products do not, at the same time, provide them capacities for coming up, in the course of time, as a competitor of the licensor himself. This position the licencee units will acquire if they also start improving the products/processes which might turn up as alternative to what the licensor offers after sometime.

It is evident from the facts that as far as India is concerned the confidence held by the foreign collaborators that the Indian counterpart firms would never succeed in building up primary technological capacities to pose a threat to the foreign counterparts was justified. This is revealed not merely in the steady increases in the number of collaboration agreements over time, but also in the fact that the number of collaboration agreements entered by individual firms has also been increasing . The NCAER study done as early as in 1971 has brought out that many firms entered as many as 18 agreements in the course of time. Subrahmanian (K.K.) in his study has noted that there are also evidence of individual firms entering into agreements repeatedly for production of similar types of products, which meant that knowledge bought for one type of product could not be used for production of similar products.

Technology transfer in the present form has only led to an international division of labour between the developed and the developing countries, parallelling the standard division of labour between the direct production workers and the management personnel in the productive establishments. In this new arrangement the direct production activity has been totally separated, and its responsibility passed on to the developing countries. For making the separation effective, a part of the management function which concerned with provision of technical and commercial support for carrying out the production smoothly has been merged with direct production activity. It follows that every increase in the collaboration agreements in the present form increases the dependence of the country on the developed countries in so far as the remaining part of the management function has been kept under them.

Associated Externalities of the Approach

Usual Technique of Evaluation : The idea that rapid economic development in the underdeveloped countries could be possible only through import of technology from the developed countries has gained universal currency. The difference in the level of productivity, in the varieties of products manufactured and in the order and dimensions of day to day changes in the industrial activities as between the developed and the underdeveloped countries are most easily ascribed to the technological levels of these countries. As the technological levels are also most easily evidenced in the character of industrial/manufacturing units, exemplified in the machinery used, production and transformation processes, materials transformed etc., the soft option of transplantation of these complexes (idea and materials) for building up a parallel of a developed economy in the underdeveloped societies has emerged naturally. This presumption has not been questioned in any manner.

The reason why the presumption has not been questioned is simple. The developed countries started their industrialization hundreds of years before, and took all these years to reach the present level of development. Therefore, if the current underdeveloped countries adopt the same path which the developed countries adopted in the past for their industrialisation, they would take the same hundreds of years to reach the current level of development of the developed countries. During these years the developed countries would also progress so that the present difference between the developed and the underdeveloped countries would not only persist but might increase. The underdeveloped countries in the process would never be able to catch up with the developed countries, which is also an objective of all the underdeveloped countries.

Thus almost all underdeveloped countries have adopted the method of technology import as the principal means for their development. In the process trade in technology has acquired an important status. Thousands of contracts have been signed for transfer to technology from the developed to the underdeveloped countries. India alone has signed more than ten thousand contracts on import of technology over the last forty years. Other underdeveloped countries also went into the process vigorously after attaining independence.

Notwithstanding this vigorous effort, however, the underdeveloped countries have remained underdeveloped, absolutely and relatively. Cause of this failure has not been traced to the basic approach in any case. Instead, search has been made of other factors which could have

prevented the underdeveloped countries from realising the benefits of technology transfer. It has been believed that but for these factors the underdeveloped countries could have reached the state of development of the developed countries.

The general consensus has been that with the transfer occurring through trade, the developed countries, in virtue of their superior bargaining position, appropriate all the benefits. Thus as interest in the international flow of technology has increased, similarly has increased the demand for imposing on this flow some form of regularity and control. This matter has also become a subject under the UNO and the UNCTAD has been specially charged with the responsibility for looking into the matter and finding an acceptable solution to the problem.

Many studies were conducted by UNCTAD and other agencies of the UNO for finding out the specific issues and problems associated with the technology transfer. On the basis of all these studies and of discussions at various forums a methodology for evaluating the aspects associated with technology transfer has evolved. In particular, it has come to be suggested, with the assumption of predominant need for technology transfer, that countries should evaluate each individual transfer proposal in terms of social cost and benefit and take decision thereafter case by case.

Implicit in the suggestion is that if only the projects which have higher social benefit than cost area adopted the essential objective of the underdeveloped countries of achieving rapid development and of catching up with the developed countries would be realized. For helping the underdeveloped countries in this matter the United Nation also issued guidelines for study of the social costs and benefits associated with transfer of technology. The guidelines sought to specify the various elements of costs from the size of the society in the import of technology and the prices to be used for evaluating those.

The cost and benefit have two components. One is internal to the firms and the other external. A case of a technology transfer is a contract between two parties and will be made only if both the parties gain through the contract. In evaluating the internal gain and loss the parties would use the relevant market prices. Evidently, with these prices, for all contracts there is gain for the contracting parties. In the simplest course of social cost- benefit evaluation shadow prices which avoid the distortions in the market prices on account of market imperfections, taxes and subsidies, etc., would be used. The UNO also suggests this methodology.

Off Hand but Valid Comment on Social Cost-benefit Analysis: In the cost benefit analysis two aspects are important—the elements which should be included in the accounting of costs and benefits and the prices to be used for evaluating them. In the analysis of private cost and benefit the elements are limited to those which affect the individuals entering into contract and the prices are the actuals associated with all transactions. A contract is admissible only when the elements and the price together ensure a benefit larger than the cost.

In this evaluation the market prices make sense since all exchanges will occur in the market at market prices, notwithstanding, the effects of imperfection associated therein. A contract by a private party will never be entered unless a gain is visible with the market prices.

With a social cost-benefit brought in, four alternatives are presented—gain in both private and social accounting, loss in both accounting, gain in private accounting and loss in social accounting and loss in private accounting and gain in social accounting. The choices in the first two cases are clear cut. Evidently, with a strong social control on the decision process, the third case will be rejected, although there is a case for allowing the contract subject to the party agreeing to compensate for the social loss caused by the contract. The fourth case is interesting for here the contract is socially desirable but would not be accepted by a party unless the government agrees to compensate the loss consequent on the contract.

Thus, per se, there is strong ground for rejection of a contract on consideration of socio-cost-benefit in one case only, i.e., the second one. However, this case will be rejected even on consideration of private cost and benefit. On the other hand, the cases of divergence between the private and social account do not indicate straight forward policy options. The difficulty is compounded in the Indian case due to varieties of taxes and subsidies operating in the market.

In the common understanding shadow prices are those which might be established under perfect competition. The distortions in the market occur usually due to imperfections in the market. In the Indian case the distortions result also from the varieties of taxes on the products out of which the Government obtains the most part of its revenue. Similarly, varieties of subsidies, including accommodation of losses of the public sector establishments, are also operative in the system. Thus, a calculation of cost and benefit with the market prices does involve considerable transfer in the form of compensation and subsidies. To a large extent, therefore, the Indian market prices can be expected to reflect

the social value placed on different items of cost and benefit associated with projects involving transfer of technology.

For countries like India foreign exchange costs have special significance. The guidelines issued by the UNO deals with the matter in great detail and highlights the different elements which should be taken into account in estimating the foreign exchange cost of a proposal. The projects do not have a direct foreign exchange earning which could be used for comparison with the cost. This is, because, whether or not, export is permitted under the contract, the prospect of export of the product has never been encouraging. Thus the Indian proposals usually show the extent of import substitution implicit in the proposal. The estimation is imputational and all projects invariably promise a foreign exchange saving of much greater magnitude than the foreign exchange cost. In the process, a policy of import substitution became associated with the policy of technology import. In any case, the estimates of benefit in this area, which is certainly in the plane of social cost benefit analysis, could never be more than hypothetical, and usable only for justifying a priori choices.

A Relevant Issue : The guideline has been issued in answer to a problem stated thus in the introduction to the guidelines:

> In recent years there has been increasing concern at the national and international level, with the problems of the transfer of technology to the developing countries. On the one hand, it is generally recognised that the acceleration of the rate of economic growth of the developing countries and the rapid improvement in their social structure through the eradication of mass poverty and of inequality of income require inter alia a large scale transfer from the vast pool of technology accumulated mainly in the developed countries. On the other hand, there is a belief that the process of the transfer of technology, if left to the prevailing market forces, would accentuate rather than alleviate some aspects of underdevelopment: it would aggravate the inequality of social and economic relations and increase external dependence.

The question is how can it be stipulated that if the projects selected promise greater social benefit than cost, both estimated strictly according to the guidelines, the problem of underdevelopment will be over for all the currently underdeveloped countries ? There has been no attempt to answer this question, whereas without an answer to this question the guidelines have no significance whatsoever.

As such, each case of technology transfer is a contract in which a domestic party is involved. It is also ensured in the contract that the domestic party's private benefit, estimated at market prices, is more than the cost, similarly estimated. The foreign exchange is also priced at market rates and not at official exchange rates. A social evaluation of such a case, following the usual guidelines, and assuming that no externalities are involved, would amount to reassessment of cost and benefit using what are called shadow prices. These prices are those that were to be established under perfect competition and free trade. Thus. when a proposal involving transfer of technology is supported under market based evaluation and rejected under social evaluation, the most that follows is the statement that under free trade and perfect competition such proposal might not end in a contract.

It is never possible to argue on the basis of the above discrepancy that a contract with these conditions would bring ruination to the country. It would evidently have ruined, if there were free trade and perfect competition, but if there were free trade a market-based evaluation would have shown a larger cost than benefit and would have caused rejection of the proposal on consideration based on market price only.

If any case, the divergence between social value and private (market-based) value does not get linked with aspects of growth and development. Social valuation computed according to the standard rules merely bring out the benefit or loss residing in a transaction in a perfectly competitive situation. It does not follow at the same time that whatever is beneficial in a perfectly competitive situation is worth adopting even when the market is not perfectly competitive, which is implied in the suggested guideline.

Aspects of divergence between private and social net product were dealt in great detail by Pigou in his Economics of Welfare. The divergence in this case was traced to external economies and diseconomies associated with private decision. Pigou linked up this issue with national income through a comparison between the net output of a firm and the consequent changes in the value of national product. Usually these two should be equal but in many cases they are not. The divergence was said to occur because action of a person might indirectly effect the output of others. In cases where the output of others increased due to an action of an individual the consequent increase of national product due to one's action could be more than the output contributed directly by the individual. For example, road laid by a firm for its own use might add to the revenues of others through general improvement of communication in the region. Similarly, setting up of a factory in a

residential area might bring down the rents of the existing houses by affecting the environment. In this case, the net addition to national product on account of new investment is less than the output contributed by the new establishment.

There can be no doubt that the above formulation join far more explicitly the effects of an activity with the national economy than the formulation based on prices. The indirect effects are easily traceable and the dimension are also quantifiable generally. The question of prices are relevant in this context only when comparisons of total effect are needed. But, by and large, quantification of the effects could be adequate for comparing the benefits/losses associated with different forms of activities.

Technology import has been adopted as the core of our policy for improvement of the technological level of the country. At the first instance a contract for import of technology raises the productivity levels of the contracting party. Such import also makes possible production of commodities for which domestic technology was not available. In the process, total output and employment in the country increases. All these, however, are direct effects of the activities of the establishments. On the other hand, since, the foreign equity participation in the collaboration agreements entered in India has always been very low the growth of output and employment resulted from domestic saving only and there was, apparently, no specific contribution in the growth of output and employment of the import of technology per se.

The direct contribution of the import of technology, under the circumstances, could be (i) making possible production of a good which otherwise could be impossible in the country, and (ii) making possible production at a low cost consequent on the advanced technological level.

The second effect, though could be expected, however, did not materialize. In almost all cases the goods produced in India, under a technology collaboration agreement, has had a higher cost of production than the cost elsewhere.

Thus, in effect, there is no escape from a search of external effect for finding out how much the policy of technology import could contribute to the growth and development of this country. It should also follow that nothing short of a direct evidence of external effect could be adequate for justifying either the whole policy of technology import or instances of individual agreements.

Training and Development of National Capability : The guidelines

issued by the United Nations for evaluation of projects associated with technology transfer cover also aspects of externalities. The element of skill formation has been highlighted in particular under the externalities. The guidelines has, however, considered only the aspect of skill formation within the establishment and has tried to incorporate the extents of skill formation in the social evaluation of a project. Different types of skills have been distinguished and it has been suggested that shadow princes should be developed for computing the overall social value of skills formed under the project. In this form of evaluation, the skill formation becomes—part of internal cost-benefit analysis.

The training imparted under the collaboration agreements and the knowledge and skill formed in consequence, constitute, in substance, the technology transfer under the scheme. In effect, this transfer is confined to provision of expertise for operating the organisation for producing the given products This skill is generated in the interest of the licensor, as discussed earlier, and therefore, this part of the contract is honoured without fail. From the side of the licencee, the acquisition of this skill is called mastering the technology and credit is taken in this manner.

This knowledge has no fall-out effect. Firstly, it is product specific, being at the same time most diffused. The total knowledge and skill involved in the production of a product, in the modern technological environment, is shared by thousands of persons in bits which are usually different from each other. Moreover, a simple collection of these knowledge and skills together with the associated machinery and tools and materials is not adequate for turning out the product. This is because modern production requires a very definite order and structure of activities, and these are not implicit in the collection.

In a modern production system, particularly engineering, two types of manpower are distinguishable—machine and tool operators and technical supporting manpower. The former group acquires skill which is specific to the machines and tools used in the establishment. Thus their skill is transferable to other establishments provided the same machine and tools are used. If different machines are used further training is needed for acquiring the appropriate operating skill. Such skills are, however, easily acquired by those who have skills for operation of similar machines. Thus the movement of such persons from one establishment to other does not involve transfer of specific skills but transfer of general capability possessed by the machine and tool operators. In this form, the movement of operators from an establishment with advanced imported technology does not represent transfers of specific skill/knowledge for

improving the production technology of other firms.

The knowledge and skill associated with the technical supporting manpower are totally product specific with all its particular specifications. These relate to the materials to be used for the product, separately for the different components, drawings and designs of the components, processing to be done at all stages, testing and measurement, assembly and fitting etc. details regarding which are supplied by the collaborators. In particular, the knowledge pertains to the organisation of materials and machines and operators so as to lead to the output of specific products with all the physical and quality specifications. This knowledge and skill have no transfer value in general.

In fact, the above has been the primary reason why the technology transfer has taken the present form of collaboration agreements, instead of being dependent on mobility of manpower, as in the past. In the past the mobility of manpower was reasonably limited due to lack of communication and other facilities, and was largely associated with migration. Nevertheless, the entire transfer of technology environment in the European and American continent were taken care of by the mobility of manpower.

Mobility to day is no less than to the past. In particular mobility among developed and underdeveloped societies is much larger to day than in the past. Moreover, as the communication has improved considerably, it has become possible to induce selective mobility. Thus, an alternative of technology transfer through the traditional method of manpower movement existed even after the Second World War. For example, the big Indian companies could hire the services of any number of persons from developed countries for starting production in different lines, instead of going for collaboration agreements. Similarly firms in India could entice away workers from other establishments producing given products within the country for starting production of similar products. Such alternatives, however, were nowhere selected though these could be cheap compared to the cost associated with the other alternative of buying technology in packaged form.

The manpower group which is crucial for development of technology is formed by those who take responsibility for developing the package, so to say, that is transferred under any technology transfer agreement. The knowledge and skill associated with is this work should be called innovative. This knowledge is retained by the licensor and does not form a part of the transfer made under the agreements. This skill is versatile

and is responsible for developing newer and newer technologies which are objects of continuous export by the developed societies. It also follows that there could be great advantage in the mobility of these persons, as the skills are neither product specific not machine specific.

The standard methodology for transfer of technology does not give rise to the formation of the innovative skills. On the other hand, since nothing could be expected to provide external benefit other than such skills, the external benefits from the side of skill formation of projects of technology transfer is virtually nil.

Diffusion of Technology : International trading in technology is a step in the direction of diffusion of technology. The trading achieves a transfer of technology, developed in a country to another country. Thus through the purchase of technology the underdeveloped countries acquire productive capabilities which they lack.

The capabilities are acquired at the first instance by a given number of establishments in any underdeveloped country. The cost of technologies is high and, therefore, the number is never very large in relation to the number of establishments operating in the country. Since the total employment in the establishments which acquired advanced technology is also proportionately small, notwithstanding the productivity differentials between the traditional and the advanced establishments, the total productivity improvement for the country due to technology import could never be very high. The belief that import of technology could be expected to bring about radical changes in the conditions of living in the underdeveloped countries is based on the supposition that in the course of time the technological level of the establishments which did not import technology would also gain through the imports of others. A possibility of diffusion of technology is held with great degree of confidence. Such diffusion should be considered as an indirect and external effect of technology import.

Mobility of manpower is one of the ways through which diffusion is expected to occur. It has been noted earlier, however, that the original transfer of knowledge occurs these days in such a manner that further transfer through manpower mobility is virtually impossible. This is particularly true for cases of packaged transfer.

Mode of transfer is usually classified in two forms—packaged and unpackaged. Packaged transfers are normally associated with specific but differentiated products or specific processes associated with production of given output like alloys, chemicals and metals. The packages are

transferred under licencing agreements.The knowledge and information transferred under the agreement have clear focus, and given the objective, these are comprehensive so that the recipient agency could have no difficulty in producing the good which is the focus of the agreements. Thus in most cases the package also includes arrangement for training so that lack of skill might not hold up production of the required good for which agreement has been made.

A company can also purchase in the market knowledge for resolving specific problem. In these cases problems or issues are the focus of knowledge transfer. In most cases consultants or consulting houses are hired for these purposes. In many cases the consultants do the job on a turn key basis; in some cases the jobs are done by the companies themselves with the support of experts drawn from the consulting houses. The range of knowledge is undefined; any type of work beginning with the preinvestment surveys to the market analysis and forecasting, and capital planning and budgeting could be covered. These come under unpackaged transfer of knowledge.

In India transfer has been largely in packaged form. The study by NCAER worked out the distribution of the contracts by the type of knowledge. This distribution also provides insights on the distribution by mode of transfer. It has been observed that only about 20 per cent of the contracts could be put under unpackaged transfer involving preinvestment services, problem solving services and drawings and specifications.

The choice of the method, i.e., whether to buy packaged or unpackaged technology, is in all cases the privilege of the buyer. Technology can be acquired from external sources in a number of ways. In the main these consist of :

(a) The flow of books, journals and other published information.
(b) Movement of persons from country to country.
(c) Exchange of information and personnel through technical cooperation programme.
(d) Education and Training.
(e) Employment of foreign experts and consultancy arrangements.
(f) Import of machinery and equipment.
(g) Licence agreement and purchase of patents.

Before the Second World War, the alternative of (g) was not dominant, and all technology transfers occurred through the other means (a,f). The system of packaged transfers through licence agreements developed only after the Second World War, and thereafter, the producers

in search of technology and particularly, sophisticated ones, have gone in for this method rather than for the others. It could be for no other reason than that except in package a transfer has no operative significance these days.

A technology which has been obtained in a packaged form, and which has significance only in packaged form, can not have any external effect. Any other firm, willing to produce the same product will find it impossible to produce the good with bits of knowledge taken out of the package; it will require the entire package for that matter. Thus one observes that in the same line of production like automobiles, motor cycles and scooters, machinery including electrical machinery, consumer electricals and electronics, many contracts have been entered independently by competing producers.

It is also unthinkable that any company will share such a package with its competitors. Thus the knowledge obtained through collaboration agreement in the country can never be expected to help improve the technology and productivity in other establishments, notwithstanding, possibilities of extensive mobility of high level manpower within the country.

There is also a possibility that the licensor from his side might impose restrictions on further transfer of the package to a third party, or insist on royalties on the same term as imposed in the original licence. In the latter case sub-licensing by the original licensee will not be attractive to the original licensee unless a larger royalty can be charged for sub-licensing. But in all these cases, the most important consideration would be whether any Indian manufacturer would like to strengthen his own competitor, or create one when there is none.

With the potentialities of indirect benefit of technology transfer reduced to nil in the collaboration agreements, the Indian firms with collaboration agreements acquire a totally different status. In particular, they become akin to the foreign subsidiaries except for the aspect of foreign participation in the equity. In relation to the Indian economy these organisations and the foreign subsidiaries are similarly placed. Both are methods by which resources are extracted from India ; both are tied to foreign firms with similar division of functions and labour; both sale products developed in foreign countries, both follow strictly the routines developed for them by their principals; and most importantly, both contribute to the development of technology and employment opportunities in the foreign countries alone. Their links with India are also similar. Both are tied to the economy only as employers of labour

and contribute nothing towards growth of employment and technology beyond their companies. All manufactured intermediate products, machinery and equipment and similar things which are products of labour are imported, and they procure in India only those which are natural products and contain very little Indian labour input.

Reversed Externalities

Technology Transfer and World Trade: After the Second World War significant change has occurred in the structure of movement of products across the international borders. The growth of multi-nationals and of licence-based production arrangements have reduced significantly the need for movement of goods from one country to another. In India, for instance many known foreign products in the consumer and light machinery sector are available as Indian products, produced under licence or by foreign subsidiaries. The range is much wider in other countries. With increase of facilities for production of international branded or patented goods in each country, the need for movement of these products has considerably reduced.

The decrease in the movement of the above mentioned goods has, however, been matched by increase in the movement of products which make possible creation of facilities for production of branded or patented or licenced goods in each country. That is to say that now the movement of goods across international borders is primarily associated with transfer of technology from one country to another for production of licenced or branded or patented goods.

The trade is also sustained by technology transfer in these circumstances. Normally, a substitution of movement of a variety of final products by a movement of products (machinery and technical know-how primarily) which make possible the production of the variety in the user- regions is bound to reduce the volume of physical movement in the course of time (though the returns might not be reduced proportionably at the same time). Thus the movement is maintainable only if new varieties are continuously introduced so that a demand for products which would make possible the production of the new variety in the different countries is maintained. In effect, the present international trade is largely sustained by continuous technological change and transfer of technology.

A Look from the Side of Technology Exporters: In a study by OECD (North South Technology Transfer : The Adjustments Ahead, Paris,

1981) the effect of technology transfer on the developed countries has been examined in detail. Two effects have been highlighted in the study — trade effect and employment effect. It has not been claimed in the study that technology transfer is the exclusive cause for the observed changes in the above respects. It has, however, been added that transfers were in many ways necessary if not sufficient for the effects.

In respect of trade effects of technology transfer the study has considered only the manufactured products. In a way, this study substantiates the arguments advanced earlier in this section; but more importantly, it also brings out the specific effects of technology transfer on the receiving countries like India. The study presumes that technology transfer has both positive and negative effects on the trade of manufactured goods. The negative effect follows from the growth of import of manufactured products from developing countries to the OECD countries, which could be related to improvement of technology in those countries on account of import of technology. The study provides data on the share of developing countries in the import to OECD countries of various products and the changes therein for bringing out the negative effect on OECD countries of technology transfer.

The product groups, whose share in the import has changed in favour of the developing countries are : Textile and clothing, Textile and clothing accessories, Hosiery, Leather clothing, footwear, fur clothing, travel goods and hand bags, tele-communication equipment, radio receivers, transistors and electronic tubes, sound recording and reproducing apparatus, calculators and calculating machines, watches, movement and cases, and toys and games. Some of these are traditional products, and highly labour intensive, so that the increase in the share of the developing countries in the import should not associated with technology transfer per se. The most important reason could be that the production of most labour intensive products is being given up by the developed countries making it possible for the developing countries to enter the market.

In respect of the engineering products whose share in the import changed in favour of the developing countries other forces were also at work than mere improvement of technology by transfer. Production of many such goods has been started in the developing countries by the multinationals themselves for taking advantage of supply of cheap labour in those countries. A large part of the output of these establishments is taken back in the developed countries. The OECD study has also presented data on the per cent of the import to US of

different products from the developing countries constituted by the output of the U.S. related establishments in the developing countries. It is observed that in 1977 about 64 per cent of the total import of non-electrical machinery from the developing countries was the output of U.S. related establishments. The corresponding figures for electrical machinery and scientific instruments were 75 per cent and 51 per cent. Evidently, direct investment of multinationals in the developing countries was responsible for raising the share of developing countries in the import to OECD countries of engineering based products.

Thus, as a matter of fact, for the technology exporting countries there is no negative effect on the trade side. All exports of technology bring about increases in the export of manufactured products and do not create possibilities of competition in the area of manufactured good which might increase the imports of manufactured goods from the developing countries. It follows that on the trade side the developing countries has only a negative effect of technology import. These countries never acquire capacities for improving their export potentials through import of technology. This is the first reverse externality associated with the technology import. The Indian Scene : The export performance of India after independence fully bears out the above. The sectors emphasised most in the plan programmes are essentially engineering based. In particular, the capital goods sector covering the manufacture of electrical and non-electrical machinery including machinery for manufacture of chemicals, metal processing etc., received the highest priority and most technical collaboration were entered for building this sector up. On the other hand the share of this sector in the total export of the country is still less than 10 per cent, with the traditional sector yet dominating.

In a study of International Transfer of Technology to India by Dr. Balasubramanyan (V.N.) some data are available showing the imports associated with collaboration agreements. Three types of agreements, have been distinguished; pure collaboration agreements, collaboration agreements with minority financial participation by the foreign firm, and foreign subsidiaries. It has been shown that for the first category during the first three years of production import as per cent of value of production varied between 15 to 18 per cent; that for the second group the percentage varied from 17 to 23 per cent ; and that for that third group the percentage varied between 11 to 18 per cent. The figures are significant. It is true that the percentage for each contract has been high initially due to the weight of import of machinery and equipment, the percentage did not, however, decline to zero. Need for import of special materials

associated with the technology of production persisted till such materials began to be produced internally. However, since the number of agreements entered increased year after year the index of import of machinery and manufactured materials in real terms continued to rise faster that the index of production of manufactured goods in India.

Another Look from the Side of Technology Exporter : The OECD Study has also examined the effect of technology transfer on employment in OECD countries. In this context also both the positive and negative effects have been traced. The exports and imports have been used for finding out how many jobs were created and lost. The balance was taken as the net effect of technology transfer by the OECD countries.

The estimates in the OECD report were based on a World Bank Study done by B. Balassa (The Changing International Division of Labour in Manufacturer Goods, World Bank, 1978). This study uses estimates of labour coefficients for different types of products as applicable to US and developing countries. With these coefficients estimates of number of jobs associated with given volumes of export and import were prepared. The net employment effect was prepared taking the jobs associated with export as gain and that associated with import as loss.

The OECD report has presented the estimates of net effect in 1976. For the OECD countries net gain was 1.5 million jobs; for USA; 150 thousand; for EEC countries 706 thousand and for Japan 504 thousand. The World Bank Study has also estimated the net effects at the end of 1990 on the assumption of proportional increases in exports and imports. It has been suggested that the net gain for the developed countries could be neutralized at that stage.

Comment on World Bank Study of Employment Effect:The World Bank conclusion is of course tendencious and is intended to show that the effect of trade between the developed and developing countries would not adversely affect the employment prospects in the developing countries, over which the developing countries are very concerned. Proportional increase in exports and imports for the developed countries, in the trade with the developing countries, would increase trade balance in favour of the developed countries and would cause income shift from the developing countries. The developed countries are concerned with income and this concern is as much as the concern of the developing countries for employment. Thus in trade between developed and developing countries, both sides should be happy so long the present

structure of commodity flow is maintained, for which the World Bank is specially engaged.

Balassa classified the developing countries in two groups —oil exporting and oil importing. The above conclusion refers to trade between developed and oil importing developing countries, which include India. Thus India, with its own objective function, should remain satisfied with the trade pattern and the vigorous import of technology and associated products.

Balassa estimated the loss of employment for the developed countries due to import by using the labour coefficients for the different items of products pertinent to the developing countries. This represents an estimate of employment gain for the developing countries due to export of their products. This estimates could also measure the loss suffered by the developed countries provided the developed countries were using similar technology for producing the respective goods.

Appropriate Correction : Balassa has given the estimates of labour coefficients pertinent to develop and developing countries for the relevant items of products. It is observed that the labour coefficients are uniformly higher in the developing countries than that in the developed countries. Thus the estimates of employment losses, given in World Bank report would require to be multiplied, item by item, by a ratio of relevant labour coefficient for the developed countries to the labour coefficient for the developing countries, to get a correct estimate of the losses suffered by the developed countries. As the ratio is always less than one, and on the average around 0.6., the estimate of total loss would be reduced by about 40 per cent. With this correction a large net gain of employment for the developed countries, as a result of trade for the years, which was the period of projection in the study of the World Bank, would emerge. This gift of employment is the second reverse external effect associated with import of technology.

The gain of employment for the developed countries occasioned by their export of technology amounts to a loss of employment for the developing and technology importing countries. The gain and loss are not, however, equal. The difference arises from the differences in the production technologies in the two types of economies.

'In almost all cases of production of a given product the developing countries use more labour per unit of output than the labour used per unit of output for production of the same product in the developed countries. Thus, if the imported products were produced within the country the

developing countries, would have employed more labour, than that employed by the developed countries which exported those.

The World Bank Study estimated that the exports of the OECD countries to the developing countries upto 1976 resulted in a net creation of 2.4 million jobs in the developed countries. It has also been estimated in the study that the amount of labour required per unit of output in the developed countries was 65 per cent of the amount required per unit of output in the developed countries. In other words, the developing countries employed about 54 per cent more labour per unit of output than the developed countries. Thus, the employment loss for the developing countries due to import of products from the developed countries was about 3.7 million jobs in 1977.

The imports from developed countries to the developing countries after the Second World War were always associated with import of technology. The exports from the developing countries to the developed countries on the other hand, were not generally associated with import of technology. Thus, there should be no need for adjustment of the above estimate for accounting for the exports from the developing countries, so as to obtain a net effect of technology import. The estimate of job losses due to imports thus is net in itself.

Final Evaluation of the Effect of Technology Import on Indian Economy

Over view : Trade in technology gained significance immediately after the Second World War. All the colonies obtained independence at this stage. The import of technology started as a means for bringing about a rapid industrial development in the erstwhile colonies. It was believed that import of technology would not only improve the level of living in these countries but also bring about changes in the structure of these economies. In particular, it was believed that the import of technology of the developed countries would succeed in transforming these poor agrarian colonies to industrialised economies of the western type.

A reflection of the change of the structure of the traditional societies should be expected in the behaviour of trade between the developed and these societies. During the colonial days the pattern of trade was simple. The developed countries, which were also the ruling countries, used to supply the colonies manufactured products and receive in exchange products of the primary sector. It was believed that after industrialisation of these erstwhile colonies the trade pattern would be changed wherein exchange only of manufactured products would dominate the trade.

According to records of trade between developed and developing countries, it is, however, noted that significant changes did not occur in the pattern, notwithstanding, the vigorous import of technology into the developing countries ever since these countries started industrialization. The items which are being exported by the developing countries continue to be primary products; and the manufactured items which have been added in this trade are textile, jute products apparel and other textile products, rubber and plastic products. These products represent a small processing of basic primary products and are generally labour-intensive in character.

However, as these developing countries are under tremendous pressure for earning foreign exchange for meeting the import demands consequent on import of technology the labour intensive activities for which large export demand exist also receive significant attention. The result has been that handloom and cottage industry, fisheries, leather industry, readymade garments, etc. have also become priority sector. Thus though there was an initial emphasis on rapid industrialisation and an attempt to change the structure of economy, under pressure of vigorous imports on the above account, all the societies continue to expand the traditional activities. An anachromy has developed in the process. A programme of rapid industrialisation, through import of technology, was adopted for sparing the economy from its overwhelming dependence on low-productivity traditional activities, whereas now the same low level activities are required to be preserved and expanded for supporting the modern sector

In effect, the technological import in the developing countries did not reduce the gap in the level of industrialisation between the developed and the developing countries; instead the gap has widened further day-by-day with the result that the dependence of these societies on their traditional activities has increased.

Degree of Industrialisation in India : According to population census records the secondary sector, consisting of manufacturing and construction. provided employment to 12.5 per cent workers in India in 1901. Employment in the primary and tertiary sectors, in that year, was 71.8 per cent and 15.7 per cent respectively. In 1981, which was the latest census year the employment in the secondary sector was 12.9 per cent of all workers. In that year primary sector employed 69.3 per cent, and tertiary sector 17.8 per cent, of the total workers.

Evidently, the degree of industrialization of this society has not

changed over the 80 years period. The weight of the primary sector decreased, and the gain occurred only in the tertiary sector.

Vigorous and systematic effort to industrialize the country as a means to improve the level of living was started after independence. The basic approach in the plans all along has also been to expand the manufacturing sector. The emphasis was explicit from the second plan onward.

The employment in the secondary sector, which was 12.5 per cent of the total in 1901, decreased to 10.1 per cent in 1951 when the country initiated its plan for rapid economic development through industrialisation. In 1961 and 1971 the corresponding figure was 10.6 per cent, which did not represent a significant change in the structure of the economy. On the other hand, the period between 1951-1971 was devoted to most vigorous industrialization in the country.

A significant change occurred during 1971-81. The percentage of employment in the secondary sector increased to 12.9 per cent. Per se, the figure does not reflect any change from the traditional agrarian character of the economy, through the rise from 10.6 to 12.9 is significant. There are also other dimensions of this figure.

The manufacturing sector in India has a large unorganised component, built up of manufacturing in small and household establishments The organised component covers the registered factories, and particularly large and medium establishments. The technology import has been confined to this segment; and the country looked forward to rapid industrialization and growth of labour productivity in the growth of this segment of the economy. On the other hand, the unorganised segment was largely based on traditional technology and has been a part of the subsistence and low productive segment of the economy, whose substitution by modern technology was an end of the policy.

In 1971 employment in the organised manufacturing establishments was about 28 per cent of the total employment in manufacturing establishments. In 1981, when the total employment in the secondary sector registered an increase of 2 per cent points above the 1971 value, the share of organised manufacturing employment declined to 24 per cent of the total manufacturing employment and 21 per cent of the total secondary sector employment (it was 25 per cent, in 1971). In other words, although the share of the secondary sector in the total employment increased during 1971-81, the share of the technology intensive modern sector decreased. As this was also the sector whose expansion relatively to the total economy and the unorganised manufacturing sector was expected as part of the programme for industrialization of the country, the

growth of the share of secondary sector during 1971-81 could not have any significance. In effect, one is justified in saying that the facts do not bear out that the programme of technology transfer and huge investment in the modern sector had materially changed the degree of industrialization of the country.

Contribution of Indian Industrialization to Economic Growth . Theoretical justification adduced for emphasising on the modern manufacturing sector as a means for improving the country's level of living quickly was that the modern sector with its large output per labour and surplus per labour would be able to generate enough investible resources and create opportunities for absorbing surplus labour from the traditional sector through expansion of the modern sector. Thus there would occur, by such transfer of labour from the traditional to the modern sector, continuous increase in the share of labour in the modern sector with its larger output per man relative to the output per man in the traditional sector. The import of technology was added in this scheme so as to ensure that the new establishments set up under this programme could invariably provide an output per man as much as that obtainable in the most developed countries.

With these conditions, the growth of economy becomes wholly dependent on the speed of transfer of labour from the low productive traditional activities to high productive modern sector. As such this did not happen in India.

Information about the investment in the modern sector and sources for financing the investment are available. In 1971 the gross capital formation in the modern sector which should include establishments under public sector and private corporate sector, was of the order of 3842 crore of rupees. Saving by the sector was of the order of 1027 crore of rupees In other words, the modern sector supported only 26 per cent of its capital formation through its own surpluses in 1971. The public sector in the above estimation also includes the general government administration and financial institution under the public sector. This segment is expected to have more surpluses than capital formation so that the percentage of capital formation supported by own surplus shown above could be an over estimate if only productive establishments are taken into account. It is also known particularly that the public sector companies as a whole did not generate any surplus in that year.

Situation in 1981 was even worse. In that year own surplus of the modern sector supported only 12 per cent of the capital formation of that

sector. The total capital formation of this sector was 27712 crore of rupees while the surplus of this sector was as low as 3374 crore of rupees. The public sector companies in 1981 also did not produce any surplus as a whole. As a matter of fact all through the decade the public sector companies as a whole made losses (except the years of 1974 & 75).

Thus, the modern sector, instead of becoming the essential growth-inducing force, as envisaged in the theoretical discussions and policy formulations, has become a burden on the economy in true sense of the term. It has sucked up the entire surplus of the traditional economy as also the foreign exchange earnings of this sector. In return it contributed very little. It could not relieve the population burden on the traditional sector; nor it provided a technology which would improve the productivity of labour in the traditional sector. Thus, notwithstanding, the unusually large saving of the traditional sector, the overall growth rate of the economy remained as low as 3.5 per cent per year.

A Critical Evaluation of the Contribution : The observed long-term growth rate of India of 3.5 per cent does not really bring out the achievement of the Indian economy vis-a-vis the programmes adopted for rapid industrialization of the society, which included vigorous import of technology. For bringing this out activities of only those sectors which are associated with industrial development and technology import should be considered.

The sectors, directly associated with programmes of industrialization and import of technology, are: primary sector; secondary sector; electricity, gas and water supply, transport, storage and communication. These are direct productive activities and for convenience has been called the physiocratic sector in the following discussions. The term has been used as the output of the sector under consideration and the net output of the physiocrats are conceptually similar. The sectors left out are: services and trade and commerce. These sectors differ from the physiocratic sector in that the output of this sector cannot be saved and invested like the output of the physiocratic sector.

The value added by the physiocratic sector constituted 74.3 per cent of the gross national product (GNP) in the year, 1970-71 (constant 1971 prices). The share of this sector decreased to 72.9 per cent in 1975-76 and 69.9 per cent in 1980-81. The overall growth rate of the GNP during 1971- 1981 was 3.93 per cent per year. The increase in the case of the physiocratic sector was about 30 per cent in 10 years, i.e., about 2.5 per cent per year. The service sector increased during this period by 62 per

cent, i.e. annually at 4.5 per cent. It is evident that the programme of rapid industrialization did not bring about significant improvement in the contribution of the segment of the economy which is associated with the programme.

The contribution of the services sector which has grown at a much higher rate than the physiocratic sector is measured by the personal income, i.e., salaries, wages and other compensations of the individuals employed in this sector. Thus the growth of this sector is merely the growth of income disbursed to the individuals employed in this sector, and has no relationship with the technology or organisation associated with the delivery of the services. It is only assumed that the value of the service created, which is added to the GNP, is measurable by the salaries/income paid to the individuals employed in the production of the services.

The estimated growth of contribution by the physiocratic sector does not fully reflect the effect of technological improvement, for which liberal import of technology was allowed. For getting an indication of the effect of technology import and consequently of technological improvement on the segment of the economy which used technology one has to obtain estimates of growth of labour productivity in the physiocratic sector. With a study of the change of this coefficient it is possible to separate out the effect of the growth of employment from the total contribution of the physiocratic sector.

Between 1971 to 1981 the total employment in the country increased by about 25 per cent. The employment in the physiocratic sector was 86 per cent in 1971 and 85 per cent in 1981. The services sector employed the remaining. During this period the employment in the physiocratic sector increased by about 26 per cent, when the contribution increased by 30 per cent. Thus the productivity of labour increased by 4 per cent over ten years. In other words, over this decade, there was virtually no improvement of labour productivity in the physiocratic sector. It also amounts to saying that there was almost no effect of technology import on the economy.

There are usually three factors suggested as cause for improvement of productivity of labour—increase of capital per unit of labour, embodied technological improvement and improvement of quality of labour. The growth of productivity of 4 per cent during ten years as recorded for this economy is palpably small. (In the developed societies the productivity of labour has growth by more than 25 per cent in each decade). On the other hand, each of the three had been very much conspecuous during this

decade. The high savings rate of the society caused the capital per unit labour grow at about the rate of 4 per cent per year, which is much higher than the rate at which the coefficient has grown in the developed countries. Secondly import of technology and of associated machinery has been very high in India and has grown steadily over the years. The factor of improvement of the qualities of labour, in so far as the Indian educational system has a relationship with the quality, has also been effective. The proportion of population with different types of education, provided by the society with due regard to the ideas of the effect of education on economy increased steadily during this decade. Thus, if the paltry growth of productivity is allocated to these factors, the share of each would be nearly nothing.

The Injustice: The non-physiocratic sector covers the central, states and local administration, the educational activities, trade and commerce and personal services. The output of this sector increased by about 48 per cent during the decade; the employment increased by about 26 per cent. This increase of productivity has ultimately been reflected in the overall growth of productivity of about ten per cent during this decade, which is all that is claimed on the credit side for the economic ideas and management.

The relationship between the physiocratic sector and the non-physiocratic sector is interesting. The non-physiocratic sector has to receive supplies from the physiocratic sector for survival. On the other hand, the output of the physiocratic sector does not require any input from the non-physiocratic sector. In the Indian case it is almost entirely true, sense, as has been noted, even the educational activities under the non-physiocratic sector, made no contribution to the productivity of labour in the physiocratic sector.

Thus, as the output of the service sector is only the money income distributed to the persons employed in this sector in the form of wages and salaries, one interpretation of the Indian case could be that the imputed output of the service sector is fictitious and merely an artificially created claim on the products of the physiocratic sector. The growth of output of this sector under this interpretation similarly represents growth of the number of claimants and of extent of claim per person. The increase of productivity of this sector, which has been estimated as 22 per cent over the decade, under this interpretation merely measures the increase of claim per person employed in this sector. The estimates are based on 1971 constant prices and, therefore, in current money price this increase has been enormous in India.

Another part of this interpretation is that the economic growth of this society, in real terms and sense, has been much less than the growth shown through the figures of GNP. As the productivity in the physiocratic sector did not rise it is also evident that the rate of growth has only been nearly equal to be rate of growth of workers in the physiocratic sector. During the period, 1971-1981, this growth has been of the order of 2.3 per cent per year. In the previous two decades also the worker in this sector increased by about this rate. As the claims on the output of the physiocratic sector by those who contributed nothing to this output also increased during this period steadily, the physiocratic output in the share of the physiocratic workers decreased steadily during this period. Such a system would invariably produce increasing intensity of poverty, as is evident in India. Decreases in the level of poverty shown in the official records in recent years might not be taken seriously, since most of it could be built around the liberal transfer of money through programmes like IRDP and NREP.

Technology Import and Manpower Issues

Output of Technology: Technology has recently become an important item of international trade. Its share in world trade turnover reached in 1965 a figure of 2.7 billion dollars, and in 1975 a figure of 11 billion dollars. In part it has become due to tremendous technological development in the United States, Western Europe and Japan . But more importantly, it has now become possible to formulate the technology in a packaged form for presentation as product for sale in the market.

The technology and the resultant output of the technology are distinct products and are sold in different ways. These are also produced in different ways. A technology which is sold is an input for production of a given product, and is itself produced for which another technology is again needed.

In the west the above distinction has clearly crystallised. In the process the activities leading to output of technology and other products have also been separated. The separation has been real and not merely conceptual. The character of products are different; different sets of persons are employed for the two sorts of activities; costs and profitability are estimated separately. The inputs—skill and physical—are also separate for these two activities.

As both parts usually operate under the same organisation, a clear relationship has also been established between these two activities in the

well. The technologies produced by the division associated with production technology enters as input for the division associated with production of other output. In the process the production technologies in the establishments continuously improve, new products are introduced, and so on. More importantly, such adoption creates opportunities for development of technology packages which are, on the one hand, useful for organising activities at the production unit and, on the other hand, marketable; and these then are marketed.

For the units which are involved in turning out general products, packaged technologies are most effective. Operations are routinised and manpower employed in the plants require only to learn the routines and adjust to them. Thus the output of technology had a tendency to emerge ultimately in the form of a package, for serving as input, in a meaningful manner, for production of various products. This is how the system has evolved in the long run from the patents of the past, which individual inventors used to take for transfer of the technology.

The data on patents bring out the character of changes significantly. For United States, which has been the leader in the area of technological development during this century, sufficient data are available. The relevant information in this regard is the proportion of patents taken by corporations and individuals. In 1901 a total of 20,896 patents were taken by individuals out of a total patent issued of 25,546. The number of patents taken by individuals increased to 31,742 in 1926. Thereafter, it started decreasing absolutely. In 1957 the number was 15,154. All these years the per cent of patents issued to individuals decreased. In 1901 the percentage was 82, and in 1957 it was 35.5. The per cent of patents taken by the corporation increased steadily during this period. In 1901 the figure was 18 per cent, and it increased to 62 per cent in 1957. [1]

The figure of patents does not fully reflect the technological development carried out by the corporations as all developments made by the corporation are not patented.[2] Most importantly, these data bring out how technology was coming up as an item of trade for the corporations.

The packages which are transferred in the trade of technology do not contain the technology involved in the development of the packages. The technology involved in the development of the package is itself never packaged because only one unit of a package has significance. A

1. Data taken from Sanders, B.S.: Some Difficulties in Measuring Inventive Activities (Rate and Diffusion of Inventive Activity).

2. Hoselitz· Socio-economic Variables in the Transfer of Technology to Developing Countries, ed: Spencer and Woroniak.

reproduction of a package, unlike the reproduction of physical products, does not require again the use of the technology which was involved in the production of the package. In effect, the technology packages are developed with unpackaged technology.

The primary inputs in this regard have, therefore, been studies and research, familiarity with related information, experimentation, acquisition and employment of knowledgeable persons, familiarity with technologies for related activities, familiarity with properties of associated materials and with measurement techniques, documentation etc. Thus mobility of manpower in this activity has great significance, for the best source of unpackaged knowledge is informed individuals.

Generally three sets of physical elements are associated with a technology-materials, machinery and physical and chemical processes/ operations. The end of a technology is the production of a well defined output for which some forms of materials as inputs, some forms of physical and/or chemical processes as operations and some forms of machinery and implements as operators are necessary. Essentially, therefore, technology for production of a given production, involves choices from all these three sets. Being matters of choices, development of technology, thus, is essentially human job; i.e. manpower and the faculty contained therein are the only inputs for development of technology.

The faculty and, correspondingly, the productivity of manpower in the activity of technology development is improved through studies, experiments and assimilation of information and in these regards various forms of aids like books and documents, machinery and tools are useful. The machinery, implements, instruments and tools are particularly useful for trying out the results of various alternatives which could be under consideration for a technology. These are useful only in these regards and have no other productive use. Similarly, the study of books, journals, documents etc., improve the knowledge and information base of the analysts and does not in itself has an effect on technology development. It is for this reason that the employment of formally educated persons, who could be expected to possess basic understanding of the situation and have capacities for digesting relevant information, has increased steadily in the countries which recorded significant technology development in the past.

The picture is most clear for the United States which made technological development as the basic input for its vigorous growth during the twentieth century. According to data presented in a paper by

Hoselitz (The Socio Economic Variables in Transfer of Technology in Developing Countries) there were 7,367 engineers and scientists employed in research and development activities in the year of 1920. The number increased to 70,033, i.e. ten fold in twenty years. Another ten fold increase occurred during the next twenty years, the number of engineers and scientists employed being 7,80,000 in 1960. Evidently the proportion of scientists and engineers in research and developmental activities in the total employment of US increased during this period at a phenomenal rate.

The above figures represent employment in organized ways specifically for producing new technology. Employment of technologists by industrial houses for producing new technologies is a twentieth century phenomena. The pioneering establishments were Kodak, Goodrich, General Electric, Dupont and Bell Telephone. By World War I there was perhaps 100 industrial research units, most of them being in the fields of electricity and chemistry. The significant progress in this area started only during and/or after the First World War. Thus only about 7 thousand technologist were shown employed in 1920 for development of technology.

The significance of the above information about the growth of employment lies elsewhere. Technological development has been the basis of industrial revolution in the west and its history goes far behind 1920's. In the earlier days, however, technology developed through individual contributions for which patents could be obtained, and up to the end of 19th Century technological development occurred through this means primarily. The situation changed drastically after the production of technology became a regular industrial activity. The patent system continued to operate ever after the R/D establishments became a dominant trend. At that stage patents began to be taken by these establishments also, and in the course of time as indicated earlier the proportion of patents taken by the industrial units increased.

The figures do not fully reflect the growth of developmental activities in the industrial houses. The patent laws of the United States prohibit the patenting of an invention if it has been in commercial use for more than 12 months. Many technologies developed by the firms go into immediate use, and to the extent that this occurs, many discoveries might not go in for patenting at all. Secondly, many discoveries might not be patented for restricting their uses in competing firms.

The upsurge which carried the US to the economic leadership of the west started only after the First World War. The dominating factor in this

upsurge was the growth of the manufacturing sector. Particular efforts for development of technology was also made in the sector through employment of special group of technologists.

Relevant data in the above regard are available in a study by Kendrick (Productivity Trends in the United States). The long term growth rate of productivity, i.e., output per unit of labour input, for the US economy for the period before 1899 was 1.4 per cent per year. The growth rate of productivity for the manufacturing sector for the same period was 1.7 per cent per year. In a way these rates of growth represent the level of technological improvement which can be associated with the institutions developed under the impetus of the industrial resolution.

Upto 1919 the rates of growth of productivity, at the levels of the total domestic economy and the manufacturing segment, did not change much. The productivity growth rates for the private domestic economy for the period of 1899-1909 and 1909 to 1919 were 1.3 per cent and 1.5 per cent per year— respectively. For the manufacturing segment the respective rates were 1.1 per cent and 0.8 per cent. In effect, there was a decline in the rates of technological development in the manufacturing segment.

Drastic change is evidenced after 1919; the growth rate productivity for the private domestic economy increased to 2.2 per cent during the period of 1919-1927, which was, however, only slightly higher than the rates for the previous period. For the manufacturing sector, the rate, on the other hand, increased to 5.6 per cent per year from 0.8 per cent of the previous decade. The figure is very little affected when the productivity growth rate is measured in relation to total factor input, combining labour and capital. With account for capital input the rate of growth of productivity (called total factor productivity by Kendrick) turn out as 5.3 per cent per year.

The American economy was depressed during 1930, which was the year of the great depression, to the end of the Second World War. So, up to 1948, the market oriented economic activities were at a low key. The recorded productivity growth rates for the period of 1929-1937 and 1937-1948 for the manufacturing sector were 1.8 per cent and 1.4 per cent. It, however, picked up immediately thereafter and the rate was recorded as 3.0 per cent for the period of 1948-1953.

The continuous growth of output per unit of labour in the establishments is essentially dependent on continuous changes and improvement of production technology. The improvement of productivity can be associated with uses of new and improved machinery and better materials or with changes of processes. All these represent

changes in the technology. Thus the linkage of productivity improvement in the manufacturing establishments with the efforts made for technology improvement is evidently straight forward. The linkage of the employment of scientists and technologists for producing new technologies by the industrial establishments with the improvement of productivity in the establishments is also equally straight forward.

The above data in effect bring out the critical role played by manpower in the growth and development of the economics. The manpower employed in research and developmental activities by the industrial units makes contribution, not to the production of current output, but to its growth, in relation to the uses of current inputs. The data also show how highly correlated is the growth of productivity with the growth of employment of technologists in the research and developmental functions under the industrial establishments. It is also evident that the vigorous performance of the US economy after the First World War has been due primarily to the activities of a specific group of persons. The activities are also found to be essentially human, and the input of human faculty alone, has been significant in this matter. The evidence, so to say, shows beyond doubt how manpower is the basis of economic self-reliance.

A Basic Question : The research and development activities under industrial establishments following the US practice, have now formed a basic institution of the Western economy. The technology developed there is now known to support not only the respective economics, but also the underdeveloped countries through the programme of technology transfer. Thus, in all those economics employment of technologists for research and developmental functions is increasing by leaps and bounds.

Contrarily, it follows, that so long as technology import is taken as the principal mean for technological development in the underdeveloped countries, each of these societies remains devoid of an essential pillar for supporting it. To that extent, these societies do not become self-reliant in the true sense of the term.

Growth of productivity is a crucial requirement for these societies for removing the utter state of poverty inflicted on them over ages. It will be a great misuse of the word of self-reliance if these societies live with the belief that they could be called self-reliant when they rely on other for the activities which bring about improvement of productivity.

The reliance in these cases is not being placed on the productive capacities of the developed countries, but on the faculties of manpower

which is employed for producing technologies in those countries. Thus the policy amounts to disregarding the national manpower for crucial functions. How could any society be called self-reliant when the national population is not dependent on for a crucial function like productivity improvements; and for that matter, how could a policy that increases dependence on others be called policy for self-reliance?

Conclusion

The British rule in India was remarkable. The instrument for exercising the rule was not the people of England. In relation to the size of the country and of the population of India very few persons from U.K., were directly associated with the rule of the country. Outside the metropolitan cities they were not even seen physically. Yet the rule was pervasive and absolute.

The real instruments were the British institutions and ideas and language. The typical British institutions like the bureaucracy, judiciary, police and universities were set up. All these were operated by the Indians, with the Englishmen providing the ideas and leadership. The liberal/protestant ideology and English language and literature became the basis of all education at the universities so that the British institutions could be readily acceptable, and the system of law and order maintained.

In the economic sphere the institution of managing agency was introduced. The system developed after eighteen-thirties when the East India Company's monopoly of trade ended. The merchants thereby acquired a unique opportunity to branch out from trading to manufacturing, for exports, in particular. For this purpose, more than the support of capital, appropriate management skill and technology were needed. This need was met by the British managing agents.

This form brought about a separation of production of commodities from aspects of higher management and technology. The managing agents provided the basic technological insight, as also the routines to be followed for producing the goods. Within this framework, the production of goods was left totally in a hand of the Indians who worked both as labourers and general and technical supervisors.

Independence was interpreted in India merely as removal of the Englishmen from the posts of authority. There was no other issue and thus the institutions and the ideology were left intact. The Government of India in the old form with all the ceremonies including the guards, bugles, horsecarriage was continued. For ruling India as a colony certain

functions were conducted in England. These were taken over and appropriate strengthening of the earlier institutional form was made for making the Government of India in India complete.

In the sphere of economy also things did not change in any way, except that the institution of managing agencies was formally abolished and that the part of the higher management provided by the Englishmen was taken over by the Indians. The separation of activity of production of goods from the activity of production of technology, which was the basis of the institutional frame under the managing agency system, however, continued. As the managing agents could no longer be employed, a system of formal collaboration with foreign firms developed for supply of technology. Except for the legal relations, the operational and distributional aspects continued to be similar. Factories are set up in India, and the Indians take responsibility for turning out products in those factories on the basis of technology and routines supplied by the collaborating firms. In return for this service the collaborating firms like the managing agents of the past, take a cut of the revenues.

The separation of the activity of commodity production from the activity of technology development was the principal means through which occurred the economic exploitation of India, which was the rationale behind political domination. The managing agents took away a large part of the revenue of the companies managed by them; but more importantly, India remained totally dependent on imports of a wide variety of products which were necessary for sustaining the production of goods in India. A continuous drain was thus established.

After the IInd World War economic leadership of England in the World was broken. America and many other countries entered into the scene and started offering technological insights as normal traded goods. Moreover, the pressures for diversification of economic activities in India opened up needs for technological insights for variety of products. All these could not be supplied by England alone. Thus, while before independence there existed economic dependency only on England, after independence the dependency in almost all developed countries has been established.

In the economic sphere, maintenance of the British institutional form was deliberate. It was argued that the easiest way to acquire economic self-reliance, at a high level of productivity, was obtaining, through purchase, advanced technologies developed elsewhere and introducing them in India. The policy was felt superior to the earlier managing agency arrangements, in so far as the choice remained with the Indian entrepreneurs and not forced on them.

Steady technological development, reduces progressively the manpower needs for production of goods. Thus, manhour expenditure per unit of output decreases steadily with continuous technological development. The reduction occurs because basic human functions are more and more transferred to the machines. The result is that human beings are used merely for operating and minding the machines, in which regard also manhour needs are decreasing with greater automation and control arrangements. Apparently the human beings become redundant in human societies with technological development.

The appearance, however, never became a reality in the West, which had the most significant technological development in the past, for an obvious reason. The technologies which make labour less and less significant in the area of commodity production are themselves products only of manpower. Thus a steady decrease in the manpower per unit of output has become possibly only by a steady increase in the manpower expenditure for development of technologies

In effect, a shift of manpower from activities which can avoid manpower input to activities which require only manpower input has been occurring in the west. So to say, instead of losing significance, the human beings are becoming more and more significant in the Western societies. In a way, the reliance of the Western human societies on human beings, i.e., self-reliance in the true sense, has steadily increased, and this has been the biggest source of their growth and development during recent years.

India adopted an opposite course. It has gone in for technological development which make manpower progressively redundant. Due to import of technology from the West, compensation for the Redundancy in India is occurring there only. Thus for this society there is a steady decrease in the significance of manpower, reflected in increasing unemployment and outmigration of technical and scientific manpower. In effect, our policy of self-reliance has steadily decreased our reliance on the Indian population.

PART FOUR

Neglected Dimensions of Traditional Institutions

CHAPTER X

SOME ISSUES REGARDING THE CONCEPT OF SOCIAL DEVELOPMENT*

Introduction

A concrete representation of a society is difficult. At the most, one can start with the collection of individuals inhabiting a country which has a physically defined boundary. The constituent of this collection of inhabitants of the territory is, however, constantly changing due to the process of birth and death. Thus, it might not be meaningful to define a society in terms of the population constituents. But, it is also possible that though the constituents of the population inhabitaung a territory are continuously changing, there are some features of that population group which survive the change of the constituents. Therefore, if a society has to be defined, uses have to made not of those features which are regularly changeable, but of those which survive.

From this point of view, there could be no significance to the term of social development, for these constant features can not be expected to change. It is no doubt true that the form of these features are, different for different societies, and also different for population groups inhabiting a given country at different historical periods. All these are, however, cases of different societies and should not be interpreted as if social features have changed.

The position taken above is rigorous, but it spares any one from thinking that the modern American or Australian Society has emerged by changes of the social features of the primitive tribes which inhabited territories of America and Australia in the past. Notwithstanding the above, however, social scientists have continued to study the possibilities and path of social progress.

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The properties which are capable of surviving over the years and can be used for defining a society are such as language, values of the individuals, bonds of relationships amongst the members of the surviving population, bonds of relationships amongst established groups of surviving individuals, forms of obligations and duties and rights, structure of faith among the surviving members of the population, established hierarchy and status and associated duties and obligations, and rules for occupation of status. On the other hand, many features of the population inhabiting a country are changeable in a regular manner, like the size of the population, population in different age groups, population in different sexes, the constituents of goods and services produced each year, the quantities of goods and services produced by a member of a population on the average each year, the number of persons employed in various forms of activities each year, the income earned by members each year, quantities of assets, technique of production of goods.

A given direction of change in the time-associated features of the societies can be considered as desirable for the population of a country. It is also conceivable that some of the rigid features of a society might not be consistent with the desirable direction of change and that these might also hinder such changes. In the original evolutionary theories it came to be suggested that consistent changes in those features of the society which we have considered as rigid occur so that progress in the desired direction is necessarily ensured as a natural law.

The suggested linear path of progress was found to be inconsistent with facts in the course of time. Many societies were discovered which showed no sign of change over the years. Investigation at this stage, keeping regard of evidences of rigid social form, was directed to finding why progress remained arrested in individual societies.

Although the paper has many sections, it has essentially two parts. In the first part it has been shown that the discussion on social evolution has been largely tendencious, being associated with the controversies between protestants (and liberals) and catholics and with colonial ambitions of European nations and that the concepts, ideas, etc., used in the discussion are utterly irrelevant for study of structured societies. The second part deals with the structured societies, in which regard the traditional Indian Society has been used as a prototype. It has been shown in particular that the structure of this society is quite consistent with the desirable direction of change of the variable magnitudes associated with the societies, and that economic development could have

been easier if advantages were taken of the structural relations of the society instead of changes in them.

Liberal Framework of Social Study

Initial contact of the Europeans with the Asian and African Societies was established through travellers and explorers, traders and missionary. Reports of these activities contained description of unfamiliar cultural practices of the individuals and groups living in these Asiatic and African societies. The opening of the new societies coincided with the disintegration of the authority of the catholic church and the development of national churches with different affiliations. All the churches, however, preserved the initial idea that conversion of the Heathens and Pagans and spread of Christian ideology continued to be desirable and virtuous acts. Thus the knowledge of the existence of so many Heathens and Pagans, waiting for deliverance in the continents of Asia, Africa and America spurred the churches, then so many, to vigorous actions, leading to despatch of Christian mission all over the world. By that time European nations had also fully appreciated the organic link between trading, population with a faith and political control so that in most cases traders and missionary moved together at the first instance, followed by other instruments and agents for establishing political control. Thus voluminous reports were available as territorial explorations intensified over the years. These reports also induced variety of interests in the western societies. Guide Books, travel instructions, etc., were also prepared under the aegis of National History Museums, for which also men were spent for collecting information. In a way, all these activities were application oriented and were intended to help the government, business community and the church in their quest for bringing the ancient societies and countries under the western influence.

In the middle of the 19th century, Darwin's theory of evolution was propounded. Darwin's ideas concerning the biological evolution linked the evolution of the animal world, and sought to provide insight into the pattern of evolution up to the stage of origin of mankind in the present physical form. With the linking of primates with mankind in the evolutionary framework it was also obvious that there was a stage when human beings were animal-like in their behaviour than to-day's man-like. Starting from that stage to the stage of European mankind of the 19th Century, another evolutionary path could also be visualised in which changes in physical form of mankind were not as important as the changes in the cultural form.

The aspect of progress was a crucial element in the controversy between the catholics and the protestants. The catholic church, as is known, based itself on the belief that given to itself the mankind was liable to follow a path of regress leading to utter degradation as a punishment for the sins of Adam and Eve. Men were saved by Christ, and the church afterwards through its continuous endeavours kept men in the path of righteousness and saved them from going down hill again. Thus the way to losen in the grip of the catholic church evidently lay in popularising the idea of cultural evolution and progress which the protestants with the liberals did unrelentingly. Till the development of Darwin's thesis, however, the effort was largely sloganists. With the new theory propounded by Darwin the ideas of progress implicit in the protestantism became concrete; and this development in effect put a fresh vigour into the movement. The cultural evolutionists by their theories of evolution of human evolution down to the current social and ideological forms generalized Darwin's ideas.

In true spirit of the time, and based on the ethnographic records available, most of which were contributions by the explorers, travellers, missionary and traders, bringing out what were felt as bizarre, strange, exotic and curious behaviour of the ancient societies, the anthropologists immediately completed a picture of the evolution of mankind from the primates to the civilized European people. Stages were marked up in the evolutionary process. It was suggested that after the stage of primates, the first stage of human life was essentially savagary, followed by a stage of barbarism, and ending in civilized societies of the European type. It was argued that the evolution was orderly and unilinear. The records of the different tribal societies, knowledge about whose pattern of behaviour was available in the ethnographic files, were used as support and evidence for such a thesis. These societies were identified with the savage and barbarian stages of human evolution, and their evidence was held out in the same way as the evidence of primate fossils in the building of the picture of biological evolution.

The analogy was carried even further. In the study of the primate evolution with the use of the evidence of fossils, the evidence of the sizes of the brain cages were crucial. The evidence of the sizes of the brain cages was used to bring out how higher stages of primate evolution coincided with improvement of intelligence and capacities leading finally to the present man-form with physical abilities for correlation of facts and for communication and with qualities of memory, control of limbs, etc. The anthropologists carried this evolutionary trend further to

bring out how the mind of the savages evolved after the physical capacities were acquired progressively and reached the stage of sophistication of the 19th century Europe. Here the effort was to see behind the behavioural traits of the savages and barbarians the rational, emotional and conceptual basis and to trace the progressive improvement of these as reflected in the behavioural traits of the various cultures.

Thus was traced the development of the mental states of the individuals from the savage stage with institution of consanguinal family where marriage groups ranged according to generations-grandfathers and grand-mothers within the limits of family were all mutual husbands and wives, and with what has called as Punalinian family by Morgan where sorts of group husbands and wives were acceptable, to the modern European stage in which both monogamy and privilege of sex-relationship with other's wives or with other women, both directly and indirectly, by repeated divorces and community arrangements for bringing up the off-spring of such relations are acceptable. Similarly was traced the development of the mental ability and vision of the persons from a stage when behind each physical object individuals could see invisible spirits to a stage when individuals could see distinct similarity and oneness among the many invisible spirits.

Some societies received the classification of savagery from the liberal anthropologists on the basis of the identities these societies had with the animal bands in respect of the method of survival. These societies were not producers of food, and only gathered food offered by the nature normally. Economic mode of survival, so to say, was hunting, fishing, plucking fruits and the like. Being human beings, nevertheless, the human hands did develop tools and implements over the generations and used them in their activities. They controlled fire, and communicated in language.

The traditional Indian society escaped being called a savage society, being agriculture based, for which the name barbarian was found appropriate.

In archaeological terms the change from savagery to barbarianism was called neolithic revolution. The neolithic barbarian societies were food producers, instead of being food gatherers. Basic economic mode was farming, coupled with, depending upon the facilities, mixed farming. Barbarism was distinguished in three stages - lower, middle and upper. The upper stage began with melting of iron, invention of alphabetic writing and its utilization for records. At best, therefore, traditional Indian society could be put according these discussions under upper stage of barbarism, but barbarism no less.

Religion and the Idea of Evolution

The liberal anthropologists did not go into economic and technological aspects of different social forms as much as they had gone into the social and mental aspects. Religion, up to the 19th century, was an obsession with the liberal intellectuals, and therefore, the evolution of mental capacities from the state of savagery to the state of civilization was studied primarily in the framework of religion, myth, magic and rituals associated with the lives of different social forms.

Ideas regarding religion were built up in Europe using the catholic based Christianity as a model. Catholic religion, with its institution of church, was a complete amalgum. It contained a blend of rituals, mythology, a structure of beliefs, elements of magic, a theology, robed monks, place of worship and spiritual and supernatural elements. Its association with the social life was also remarkable. Nearly all major events of social life-like birth, marriage and death - were associated with the church. It contained suggestions about how individual and social life should be conducted, how the non-believers should be treated individually and corporately - conversion, burning at the stakes, etc. Through its control over the social life, it also turned out in the course of time as a powerful political force and exercised overt political control.

Western anthropologists more or less adopted the visible dimensions of catholic religion as a definition of religion. With this definition then efforts were made to find out,the proportions in which the elements were combined in different societies which were under investigation. In effect, what they called different religions were disproportionate blow-up or reductions of the elements identified as parts of the catholic religion. Difficulties were evidently faced in studying the emotional and other basis of societies with such a structured concept of religion at the background. As is normal with the intellectuals, there were extensive disputes on uses of words, meaning and definitions in this area, though nothing depended on the final outcome of these disputes.

Western intellectuals, before they embarked as anthropologists on their voyage for search of truth in the distant continents among the aboriginals and the tribes had familiarity with two more religious forms - Jewish and Mohamedan. Jews at that time had no kingdom, and thus in their case religion was the basis of their nationality. In particular, after the Diaspona, the destruction of the temples and the disappearance of priestly authorities made religious practice the distinguishing criteria of

Jewish identity and the focus of ethnic and community values. Communities were organised around the synagogue and the rabbi as the interpreter of law began to function as both religious and community leader. Thus rabbi's role traditionally had community significance rather than religious significance.

In the case of Mohamedan religion two features were remarkable. First, originally the expansion of the religion and of the empire went hand in hand, the leadership in both regards being provided commonly. Thus the distinction between the religious authority and state authority was absent. This aspect was also unavoidable which was its second feature. Islam has been conceived as a community under a system of laws as much as a society with a particular religion and faith. Political and religious institutions were one in theory and closely related in fact. Thus religious functionaries were associated in various ways in the administration of the realm. The Ulema were teachers, preachers, legislators, magistrates and judges and became parts of the hierarchy of the state organisation, receiving for their services payments and pensions from the state.

In effect, thus, the three religions had closely similar dimensions and differed only in their structural proportions, dependent on the accidents of socio-political parameters under which they functioned. On the plane of theology also they had great similarities. All believed in one God, supreme, omnipresent, omnipotent and formless. In fact, the ideas regarding God had a common origin in the Jewish conception.

All the three religions were similar in many ways. The primary domain of religion in all these cases was social, political and cultural aspects of life of individuals. Permanent machineries also existed for ensuring that life was conducted according to stipulated pattern. The church in the catholic societies in association with the political authority did it; under Muslim societies, the function was done by the political authorities which combined the religious aspects also, and the rabbis with their synagogue which were permanent institutions under the Jewish society did it for the Jews. The authority for doing this in all cases was obtained from God, who in all cases was held out as the supreme being, without any form and the sensible properties of other existent being, and whose existence was made out as a matter of faith, without sensible basis. In effect, the corporate society was run in the name of God, by his agents and with his mandate; the agents in the process occupied a position in between the God and the people.

With this understanding of the religion, based, as it were, on the above, the anthropoligists began their investigation of the evolution of cultural forms and the mental faculty of men through the ages. The religion is a word in the English language which has no counterpart in the languages of primitive societies. Even the languages of Sanskrit, Greek and Latin which as languages of primitive societies were well developed by the modern standard, did not contain synonyms for religion. The nearest word in Greek and Latin are equivalent to the English word sacred (Sacra in Latin). In Sanskrit the nearest word is somewhat parallel to the word culture used in English (dharma with root word Dhri, signifying to hold). The equivalent of the word sacred in Sanskrit is Pabitra, meaning clean, and is used as an adjective qualifying both material objects and mind, thought, etc. As the words in the languages of the societies with their usages reflect significantly the social, psychological and particularly the cultural structure of the society, evidently, therefore, religion, as connected by the word, did not prevail in these societies. It was, therefore, not also possible to obtain by the anthropologists from these societies a description of their religion in their own languages. Thus, in effect, the anthropologists merely identified those aspects of the behaviour and thought of the people of the currently surviving ancient societies which parallelled the behaviour and thought elements falling in the complex called religion in the European Sense, and combined them to form their ideas and image of religion of the ancient societies. These images were then used to trace the progress of the character of religion over the years including the progress of mind-form. Existensive field work was also involved, and every thing was done for dispelling all doubts about the empirical character of the investigation and of the hypothesis.

Concept of God and Structure of Societies

Significantly, traces of parallelisms were found abundantly in the still surviving ancient societies. Although there were no institution as church and clergy with robes and collar, buttoned up at the back, in most of these ancient societies a group of persons who stood between individuals and spiritual world were found. These persons have been variously called-magician, medium, witch, shaman, Sorcerer, diviner, doctor, medicine-man, priest, prophet. In some cases these persons operated as specialists, in some cases these functions were conducted by individuals who were otherwise engaged in routine social activities. But generally, these were

distinct set of persons in the society like the clergy in the Christian societies.

Moreover, the strength of these persons lay in their ability, according to their claim and/or popular belief, to access forces which were beyond ordinary comprehension and to use these forces either in favour or against individuals. In both cases the superiority of these middle man was established, and this superiority also afforded them opportunities for influencing others and their behaviour. Some took the opportunity and used it for their own benefits only; some also used it for own benefit and benefits of the Corporate Society.

The status of these religious specialists was not uniform and wide variations have been met in this regard in the field studies. But most importantly, in these area also parallelism could be found with the status and function of the religious specialists known to the anthropologists from their European experience. In many societies the chief and the religious specialist were one and the same, looking after the essentially religious affairs and also the social affair. In some societies, there existed like the catholic societies separate agents for religious and social affairs who jointly operated and took care of religious and social affairs. In some cases, the specialists, as in the case of magicians, shamans, medium,etc.,operated individually without any institutional frame. They had their own clientele, which could cover the entire community or parts of it.

Associated with these religious specialists, many other aspects which fall under the complex called religion were also evident. The specialists in many cases were seen to have their own ritualistic behaviour in the conduct of their functions. There were evidences of corporate rituals in the conduct of specific functions - initiation ceremony, beginning of cultivation, harvesting, etc. There were also evidence of ritualistic behaviour in personal lives as in the case of birth, death marriage, etc. The religious specialists were in most cases associated with these rituals giving the impression of an association of these rituals with religion. A variety of special objects was also involved in these ritualistic acts. These were identified as the sacred objects; and with all these, in a way, a parallelism with the organised religion was easily seen.

Most crucial was finding parallel of the concept of God in the frame of the traditional societies. The idea of religion in the context in which the English word is used is never complete without entering God or some thing like God. Anthropologists usually start with the working definition of religion suggested by Tylor and Frazer. Tylor proposed as the

minimum definition of religion the belief in supernatural beings. Frazer understood by religion a propitiation or conciliation of powers superior to man which were believed to direct and control the nature and human life. Further work in this area only added additional dimensions in definition and did not question the core which the above definition provided to the concept of religion.

From a common sense point of view there could be no escape from the above definition. Religion as a word in English language is distinguished from the other word-culture. In effect, religion is taken as a part of culture, distinguishable from other parts in terms of special properties possessed by the concept of religion which the other parts do not. The belief in the supernatural beings and the behaviour contingent on it are, therefore, a basis, and an essential basis at that, for the distinction. On the other hand, if the element of belief in supernatural being is removed from the definition of religion, the other elements of religion which are the various personal and social practices and rituals would have no means for distinguishing themselves from the so-called non-religious practices and rituals associated with the lives of individuals in communities.

The concept of God, however, is complex. In one plane it is also simple, being non-material and formless. This is also the difficulty with the idea, for it cannot be conceived and described. The idea is not also a part of the instinct of man, for God is supposed to have the entire creation under his concern, and therefore, he could not have restricted himself to being a part of man's instinct and not the instinct of other animals and natural beings. Thus the knowledge and feeling about God, which are now a part of the culture of all communities in the world were not easily acquired. It is said that the knowledge is not also acquired, it is revealed. But this experience has not been shared by all; only the prophets had it, which was transmitted to others. The transmission, in view of the difficulties associated with the idea could not have been an easy job. Records of uses of force are also available in the conversion of non-believers to believers. All these are parts of recent history.

No thinking persons, believers or non-believers, could, on the other hand, escape a distinction between the effects which man could bring about and which they could not. This is true as much today, as it was in the past. The content of the boxes has only varied over the years, but both boxes exist today as it did in the past and both have been non-empty always.

Effects, men themselves could bring about, even in the distant past were not insignificant. They developed mechanism for controlling fire;

they domesticated wild animals and reaped the benefit of the animal's biological and physical features; they developed methods for cultivation of varieties of crops, they built houses and shelters; they developed clothes for escaping the nature's bites; they developed wheeled transports for their own movement and movement of goods; they developed boats, including sails, and barges for voyages in seas and rivers; they developed potteries, and technology based on wheel; they harnessed animal, water and air power; they developed metals, and weapons and tools with the use of metals; they developed carpentry and smithy for reformation and reshaping of metallic and wood-based elements. More generally, they had provided a sufficient foundation for supporting the industrial revolution which came in the 18th and 19th Century in Europe.

There were also many effects which men could not bring about. About some of these, like making the tail of a dog straight, men could be indifferent, but not about all, for some of these effects could also destroy the effects men themselves brought about. Such were the rain, the flood, the rotation of seasons, the sun light, the storm etc. The death of individuals also fell in this category. All these had variable consequences on the lives of the individuals - sometimes good and sometimes bad which also could not be escaped. These features were also recurrent, not like the great flood mentioned in the scripture, so that they remained in the mind of the individuals all the time. Every night in winter times, the absence of sun light is felt.

There could be many ways to react to these inevitabilities. One could develop an attitude of respect and humility towards these features. As a part of the respect one might elevate all or part of these features, including the supposed agents to god-hood, depending upon the flexibilities and uses of the languages; or one might, notwithstanding, the linguistic flexibilities or inflexibilities promote one above all others. In other words, the expressions of the respect and humility might be different, in which regard the language necessarily played a key role. In most cases the expressions had nothing else than linguistic significance. The term rain-god might have been used, but no body attributed to rain-god any special power, i.e., people did not ask the god to provide a shower of grain instead of rain, which he could be expected to do by exercise of god-like attributes.

Nor was there a change in the normal routine of activities which could be justifiable if there were any association of the properties, or even a part of that, ascribed to God in subsequent periods with the so-called rain-god or sun-god. For example, the routine associated with cultivation was

rigorously followed, ponds and canal were dug, clothes and other cover for body were developed for escaping the chill of the winter nights.

There could be other ways of reacting to the situation also. One could build up a myth of supernatural agents controlling such natural features over which human beings had no control but were subject to the effects; one could also claim communion with those agents and ability through such communion to control these events, which could be harnessed either to the benefit or to the detriment of the interest of individuals. Such ideas and claims could also be sold, and to the extent, takers could be found, a clientable was also possible providing opportunities for personal gain. The sale could be made by glib talks, by demonstration of the capacity as far as it made sense and got appreciation, and by demonstration of the relationship which existed between the supernatural agent and the claimant of the capacity in which regard sense trances, etc., could be effectively used.

The anthropologists have classified on the basis of the study of ancient societies, the religious specialists in two groups - priests and others including magicians, shamans, diviners, doctors, prophets etc. The second group of religious specialists operated with claims of persons - to-person communication with supernatural spirits. The shaman bullyragged gods and spirits and channeled their power in the desired directions; the spirit mediams allowed themselves to be transmitters of the actions of trans-human entities; and prophets undertook to express the wishes of supernatural beings, the knowledge regarding which was founded on revealation. Magic constituted special application of the forces of sacred powers by the magicians. The action of all these specialists are non-calendrical and contingent upon occasion of mishaps and illness associated with the lives of specific individuals or groups of individuals and not with the community per se. In contrast to all these specialists the priests did not possess any person-to-person relationship with the supernatural agents and the spirit world; they were only competent to conduct rituals which were usually calendrical, and were performed for the benefit of whole village or community at critical points in the ecological cycle. In particular, the priests conducted rites which were socially suggested so that there was no seller- buyer relationships in their functions. Thus from the priestly view point it was the office, role and the script which were sacred and not the incumbent of the priestly office. In the other case, the halo associated with the practitioner, and not with the practice.

Religious specialists of the type of shamans built up their clientele and

status on their own strength and capacity but always had a spirit or god in front or behind, whose strength they made out as their strength. As the business of a shaman in a given society could be profitable, money and status-wise, depending upon the size of clientele, there was always attraction for this profession for the enterprising persons. In most cases, new shamans could enter only by championing new gods, in which case two fold competition would be unleashed between the shamans individually and between the gods they championed.

Thus depending upon the strength and capacities of the contending religious specialists in the different societies, order among the gods were invariably established, confederal, federal and unitary structures were equally probable cases so that some times and somewhere the concept of one supreme God emerged inevitably.

In the course of time the clientele associated with the individual specialists could also be identified as clientele associated with the gods championed by them so that the competition among the specialists could be generalised to competition among the gods. Thus in a significant way, though the starting point of the competition could be personal gains for the specialists, in the end social reorganisation became one of the consequences. The emergence of prophets with personal charisma was crucial in this context; in particular, the concept of a supreme God, to a large extent smoothed the tensions in the society which were built around many gods.

These religious specialists invariably operated for personal gain status, money, share of output. Ancient societies could be classified in two broad groups-one rigorously structured and the other unstructured. In the structured societies the status of individuals in the group, the manner of division of labour and of income, the pattern of succession in the social hierarchy etc., were rigorously determined by conventions. In these societies, therefore, religious specialists could have only the status conventionally accorded, and they could not be expected to change the status in their favour by any means. As the duties and the roles of each individual in the society were also laid down there were also no room for innovation. Even the so called religious functions were determined so that there were no room for changes in the practices also. Sorts of social rituals necessarily developed in such societies for which priests could be accommodated but never the shamans or their type.

That in the same society shamans and priests could not operate were noted by the anthropologists also. It was brought out that shamans operated in societies of hunters and food gatherers generally, whereas the

priests operated in established agricultural societies, and that many types of specialists were not found in the same society.

The classificatory parameters were, however, wrong. The mistake was due to the emphasis laid on the search of the locus of evolution of the mind form, which arose from the conviction among the liberal methopologists of the reality of evolution and of its trend towards improved form. In the process may facts were neglected. Agricultural societies were asset-based and social stability depended on conventions and rules regarding sharing of assets and liabilities and of income from assets, continuously over the generations. The principal characteristic of these societies was, therefore, the formal structure, rather than the nature of economic subsistence. The food gathering societies, on the other hand, were not asset-based, and lived on a day-to-day basis allowing for continuous adjustments in the pattern of distribution of income as also in the quantities of income. In effect, the group functioned as a collection of individuals without sufficient rules, regulations and convention to cement the collection into a social organisation.

The essential features of the structured societies of the past were: status orientation, clear cut duties and obligations associated with different status positions, rules regarding occupation of status positions by individuals, succession rules for status positions, and corresponding rules for training of individuals, rules regarding division of labour and income and assets, and methods for ensuring operation according to the needs of the structure etc. In some societies social and personal activities including rituals were also put under routine, and wherever possible, calendrically. The enforcement of the structural obligations could also be social and a part of the structural relations, in which case the system became politically indifferent. And in any case, with rigorous social inter-relationships governing all aspects of human behaviour, the system is also god-indifferent, in the sense that god was not necessary for maintaining social integration. This was also one reason why shamans and their type could not operate in these societies.

In the unstructured societies, on the other hand, social bonds did not arise out of social relations. Up to a certain time survival depended on strength afforded by collective living in the face of hostile environment. Once the exogeneous dangers receded, both because safer environment was found and tools and weapons were developed for protection, this bond loosened. Internal bonds built on reciprocal relationships never developed in some cases.

The collection was preserved in some cases, in some other cases new

collections were formed by combination of desperate bonds through forces operating exogeneously. In most of these cases the bands were subjugated by some one from the band itself. In this process spirit/god and religion played crucial role, it made the submission of the community to the aggrendizement a matter of their own choice and allowed gradual crystallization of a corporate segment of the community which engaged in political, religious and social affairs and ruled over others and lived on them happily and ostentatously and reduced the others in the process to utter states of destitution. Also in the process god was made the symbol for society, as Durkhein noted, though in a different context.

Progress in Structured Societies

The issue of progress in structured societies is altogether different. The social features have been classified in two types—rigid and time-associated, i.e., changeable. As the rigid features are the parts of the structure of a society, it follows that societies with given structures are compatible with any form of changes in the time-associated features.

The progress, however, should be identified with changes in given direction of the time-associated features, and therefore, the relevant question is whether the rigid features could be compatible with given form of changes in the time-associated magnitudes. The question has been generally answered, being that if the rigid features are compatible with any values of the time-associated features, these are also compatible with specific set of values, and correspondingly with definite pattern of change of the time- associated features.

There is yet another question which is that whether the realization of the desired values of the time-associated features could be easier and less costly if the rigid features were changed. There should be doubt that some forms of structural relations have advantage over other forms in respect of some specified functions. For example, with the same extent of effort a body with wheels can be moved faster than a body without wheels. On the other hand, it is also true that some changes are always facilitated if advantage can be taken of structural constraints on the body. A train is constrained to move on iron rails for which its flexibility is limited. However, in the matter of moving bulk goods, this constraint is most beneficial since very little resistance is offered by the iron rail. From this point of view, structural change could be harmful. In the social areas also, similarly, one can identify essential structural relations which could be harnessed for directing the society towards given ends. The issue in

this case, is not, however, what changes have to be brought in, but how given relations could be utilised for better purposes. The remaining part of this paper examines this aspect in the Indian traditional social framework.

India has been fortunate in the past in being one of the structured societies, with bondages provided by the internal relationships alone. The internal relationships in the case of India was also complete, and covered all aspects of socio-economic life. Since the activities were all interrelated, and also since all aspects of life were covered under social relationships, no need was felt for independent establishments for political and social administration. Thus the society, could remain completely indifferent to the exogenous political imposition to which it remained subjected for a long period. As the society was also god-indifferent, the exogenous political imposition which invariably had religious overtones with ideas of its own god, and which intimately associated religion and political administration as part of its belief and action structure, did not effect the essential life system of the Indian Society. The god-indifference of the social structure, in its own way, was also complete. The Aryan ideology on which the Hindu social system was built, admitted and was consistent with paganism, polytheism, monism and even atheism and the individuals in the society could entertain any belief structure. All these beliefs were consistent with the social inter-relations governing the socio-economic behaviour of the people. In a way, the Indian social system was conceivably the most secular and separated completely activities from faith in the society. The values that it propagated as a part of the system also added that conduct of obligatory social/economic duties with devotion and selflessly is all that is necessary for receiving the grace of god and respect of others. In this way, opportunities for influencing the course of actions in the society by any faith-based religion were reduced to the minimum.

In the plane of actions and obligations it harmonised the social and occupational classes and marriage regulations in such a manner that proportionalities in the distribution of population could be preserved, and that the population structure could remain dynamically stable, independently of the size of population. Economic interdependence among the classes, was also strengthened by adding ritualistic obligations of various sorts so that appropriate proportionalities in the income distribution could be preserved. All these made living as a part of the system easy and outside it difficult. With occupations bound with the family it also made learning and entry into occupations easy, and ensured global dynamic stability of the system.

The stability of the system has been demonstrated historically. The system lived through protracted periods of political domination under agencies which combined politics and faith-based religion in the most intimate manner, and used politics for spreading faith and faith for consolidating political domination. Islam and Christian system which dominated India politically for more than one thousand years were both forwarded looking during the middle ages The phenomenal expansion of these religious and cultures which had no national affiliation, depended on political conquest. India has been the only country which came under their political control and remained under the control for a long time and still did not adopt their religion and culture at a national plane. The society continued to be based on the traditional cultural patterns, withstanding successfully the severe pressure for change to which it remained, overtly and covertly, subject all the time during the period of political subjugation.

The strength lay essentially in three factors. First, was that conduct of all work was treated not as a means to earn income or any form of return but as obligatory duty, which made the social value of all forms of work equal without compromising the physical productivity of the activities. Possibilities of disproportionate occupational growth were checked by linking family and occupations. The second was that austerity in personal life was accorded greater social value than ostentation; and this ensured reasonable equality of living standards in the society independently of level of income. The third was that in the social scale the highest position was accorded to acts of charity and indulgence in ritualistic ceremonies which led finally to redistribution of income from those with surplus to others who needed that, as the ceremonies necessarily involved services of various classes of persons. Thus physical productivity up to the limits of technological and human efficiency and distribution of output as equally as possible were made a part of the cultural and social obligations and not dependent on economic and market forces. Significantly, in this respect the Indian system contrasted sharply with liberal system. The liberal system made a virtue of social and political equality and justified wide economic inequality, while the Indian system was primarily structured for ensuring economic equality at all times so that attractions for remaining members of the community are never lessened.

Although during the days of British rule forces of self-interest was being induced as a part of the propagation of liberal ideas, the traditional values still survived and dominated the general behaviour of the people.

Most growth of education occurred through public charity. People donated liberally for building temples, lodges for pilgrims and travellers, stations for serving drinking water, hospitals for men and animal, etc. Charitable work received much more appreciation than ostentatous living and its display. People were inclined to hide dishonest intention and actions; concern for social appreciation and approbation dominated individual's behaviour to a large extent, and most importantly, people felt ashamed of any charge of negligence of obligatory duties. Even labour disputes in modern industrial sectors could be resolved with greater advantage to the labour by insisting on the duties of the employers towards the workers as in Gujarat under Gandhiji's leadership than by resorting to pressure as under communist dominated trade union movement.

The traditional Indian system harmonised not only the structural socio- economic relations and social values but also the relationships between the human society and the physical-natural environment. In a way, establishment of an ecological balance at a global plane was also implicit in the culture of the society. Introduction of flowers, leaves and branches of plants, etc., by name in the ritualistic festivals so that these are grown abundantly in individual houses, suggestions for valuing vegetable-based foods more than non-vegetarian foods, association of various types of animals with different gods, elevation of rivers and hills and other natural features and phenomena to sacred states, etc., were all capable of developing a sense of respect for and dependence on nature in large or small measure. In fact also, it did develop that sense.

The Indian socio-economic relations which determined the social interdependence were defined in terms of families. The families were corporate units, which transcended the lives of individuals who were the members at any instant of time. Dimensionally the society and the family were thus similar so that the treatment of families as proper components of society and establishment of relations in terms of families rather than individuals were essential for the dynamic stability of the society.

Relations defined in terms of families, were person indifferent and endured the effects consequent on the changes of members of family due particularly to the processes of birth and death and marriage. Thus the occupational structure of the society was given in terms of families. It also followed that the family-linked occupational structure and the socio-economic inter-dependence implicit in the Indian culture were compatible only with the self-employment of the workforce and that wage employment being contractual relationship between persons could

not be a part of Indian social relationships. The occupation belonged to the family; and the family acquired both the responsibility and the privilege of providing the service needs associated with the occupation of other families. As the relationships were defined in terms of families, which were the basis of interdependence and income flow, there was also inherent resistence to disintegration of families. Thus when the population increased, the sizes of the families increased, and not (so much) the number of families. In keeping with this, there also developed the tradition of putting the family name, the name of the village, and some times the personal name of the father, as a part of the names of the individuals.

In effect, the families under the traditional Indian system had two dimensions. It was a reproducing biological group, which maintained its occupational capabilities all the time. For this purpose, it developed its own training arrangements. The children were entered into the family trade and were allowed to learn the skill through experience and guidance from the elder member of the family. The family, so to say, took the responsibility for bringing up the children in a manner which made possible the replacement of the retiring and dying members of the family, not merely in numerical terms but also in terms of qualities and capabilities so that the essential dimensions of the Indian families could be preserved.

Occupational training is essentially linked with the prevalent technology and is successful so long as the trainees acquire appropriate skill for conducting themselves within the framework of the technology Judged from this side, the skill formation in India progressed admirably over the years. Up to the time of British entry in India, the standard of industrial and agricultural productivity, excluding the military sphere, was not merely comparable with European standards but also superior in many directions. The Indian standard fell behind the others only during the British rule in India. There is also ground for believing that it was not the traditional system, but its disintegration under the pressure of alien rule, which caused this.

In general, the arrangement for skill formation under the Indian social system was perfectly meshed with the predefined social interdependence under the system. It was compatible with the growth of population and of output, where in particular the economic activities were also conducted within the framework of the Indian Social System.

Under the current economic programmes both high rate of growth of output and production in large scale establishments are emphasised.

Production with a high level of output, and large scale production with horizontal and vertical integration of processes need not necessarily go together. Even the aspect of technological development can be separated from the above two. Only in the case of large scale integration of processes - horizontal and/or vertical - on the other hand, need arises for employing a large number of persons under one roof.

Production under the modern technological environment is either separable by stages and processes or is not separable. In the chemical industries the processes are distinguished but usually not separable. Such activities have to be conducted integrated environment, bringing together large number of workers of desired skill and ability.

Most other forms of production are separable by stage and processes. In particular, most activities involving processing of agriculture-based or metal-based inputs are separable by stages. Technologically, therefore, these processing stages can be performed either under one roof or under many roofs. Each stage is complete in itself in one sense; the input it handles is the output of another stage of activity; the input is reached to the particular stage for a given form of processing; and after the processing is over the output is kept ready for transfer to another place for the next processing. For the complete production involving a series of processing stages, the two activities of processing and material handling are separate; and so long as the material handling are separate and can be dealt independently, the production stages are also separable from each other with appropriate production planning and organised material handling. In effect, if the latter two activities are taken care of, the processing stages can be physically separated. Such a separation does not have any effect on the operational efficiency, which continues to depend on the efficiency of the machines and skill of the operatives. The organisational efficiency, however, depends in such circumstances on the efficiency of production planning and material handling.

Production, organised in the above physically distributed manner, is carried out even otherwise on economic and technical grounds. The development of ancillaries, vertical disintegration for stagewise economy of scale, etc., are common features. In Japan large scale production in many fields of activities is carried out as combination of small scale activities spread in dispersed villages, without jeopardising the competitiveness of the products in the international market.

Thus it follows that there is no necessary and unique relationship between large scale production under modern technological environment and production under a roof with thousands of persons working together.

Some activities require to be conducted in integrated manner, whereas there are many others which can be conducted in disintegrated manner under many roofs without necessarily sacrificing productive efficiency. Most product- manufacturing activities, such as processing of agricultural and market based inputs and electronics fall in last category.

Thus total disintegration of occupation-based family structure was not necessary in India for ushering in modem technology-based economic environment. Many activities could be developed around the families in their traditional setting through provision of facilities for skill upgradation, and supply of modem tools and equipment for production and testing, and of modern inputs, and through coordinated handling of input and output. It was also possible to organise these around the traditional social structure, in which case the benefits of the social relations and values of traditional societies could be availed. Significantly, Japan organised its progress in the post-war years exactly along these lines. The traditional village-based societies were not destroyed there; and wherever possible the activities were sufficiently disintegrated to fit in with the traditional structure. On the other hand, since a disintegrated process could operate only with rigorous planning, coordination and control, and on the physical side, with coordinated purchase, sale. material handling and distribution, testing and quality control, and with organised assembly, there the essential paraphernelia of modern production system has been integrated with the organisation of disintegrated production processes. Thus at a different plane all these components of the production system are capable of projection to bring out the subsumed largeness of the operations. Significant extent of research and development is also capable of being absorbed in this organisational complex for continuous technological improvement, which has also been an essential component of the Japanese system.

How much India were to gain if development during the post independence days had proceeded within the Indian institutional frame is difficult to answer. The policy makers have deliberately chosen path, *which systematically destroyed the India's traditional frame, with the* belief that within the Indian framework progress was not possible. Thus no comparison is possible.

The first impact of the new emphasis has fallen on the families. The institution of family as a biological and economic group is incompatible with the new order built on largescale enterprises. Thus the institution of family has started to disintegrate, so that individuals could become the primary units of the society. An immediate consequence has been that

unemployment, which is a property associated with individuals, and not with the families started appearing as a feature of the society. This unemployment has not been caused by the growth of population, nor by lack of opportunities for wage employment. As discussed earlier, the Indian society was strictured for accommodating growth of population so that within the framework of Indian System additions of new activities through opening factories and establishments would only have increased employment opportunities and could never have led to unemployment.

Unemployment in India, as per cent of population of labour force, has not been rising significantly during last 30 years. But the proportion of educated persons among the unemployed persons has increased so much so that currently most unemployed persons are educated. In the early fifties, on the other hand, most unemployed persons were illiterate.

Under the traditional system the education and training were intimately associated with the household's economic activities. With the emphasis on largescale production outside the household sector separate organisation was developed for education and training of young persons. This organisation necessarily became separate from the organisation of production, so that in the course of time the education and training and the skill/knowledge needs of the occupations became unrelated, leading to wide spread unemployment among the graduates of the educational institutions. Today, the proportion of matriculates or above in the working force is less than the proportion of matriculates or above in the working-age population. This shows that the employment of matriculates or above is less than what it could be if the persons were randomly employed without consideration of educational qualification.

The situation mentioned above has emerged primarily because the education and training provided in formal academic establishments have become separated from the economic activities. The education is thus no longer relevant to the needs of the economy.

CHAPTER XI

POPULATION, FAMILY AND ECONOMIC GROWTH*

Population in Classical Economic Theories

Population figured very prominently in the classical economic thinking. This arose from the concern of the classical economics for study of the economic behaviour in the context of nations or national states. Population of a state is one of most obvious aggregates in the context of a study of the economies of the national states. Population was looked from various stand points in these analyses. It was the base from which labour was drawn for support of production. It was also the user of all that was produced in the economy and offered for sale. Thus both its size and the change of its size over years were matters of interest for the classical economic thinkers.

Adam Smith regarded growth of population as both a consequence and a cause of economic progress. He held that increasing division of labour would bring about greater productivity and would furnish enlarged revenue and stock, and consequently enlarged wages fund, and increased demand for labour, higher wages and condition favourable for population growth. He also held that a growing population, by widening the market in turn facilitate further division of labour and production of wealth. He even added at one stage that the most decisive mark of the prosperity of any country was the increase of the number of its inhabitants.[1]

*An enlarged version of the Section of Issues of Population and Population Policies included in the monograph - Development of Human Resources - Population Policies and Manpower and Employment Policies of India Govt. Report; prepared under a Programme of Studies on Cooperation and Development in South Asia.

1. A. Smith : Enquiry into the Nature and Causes of the Wealth of Nations (edited by E. Cannan) Volume I, p. 72.

Adam Smith also, notwithstanding the optimism and the perspective of prosperity contained in the working of a competitive system predicted stationary state. This he believed would came about through intense competition among the producers leading ultimately to fall in the amount of profit and consequently in prospects of accumulation.

The idea of stationary state as a possibility and to which economies are liable to converge also figured prominently in the subsequent writings of the classical economists. It is in the explanation of this possibility of stationary state that population played a crucial role in the subsequent discussions amongst the classical economists. Malthus hypothesized a relationship between the growth of agricultural produce and the growth of population and concluded that the size of the population of a society would remain invariably tied to the volume of agricultural produce. Normally the population has a tendency to grow at much faster rate than the growth of agricultural produce but when the population grows larger than what can be supported by the agricultural produce, through occurrence of famines, epidemics and starvation caused by inadequate food supply, a balance is again established. On the other hand, when the population grows at a rate smaller than the rate of growth of agricultural produce the higher levels of income would induce larger growth of population leading again to a state of affair where individuals receive merely what is essential for subsistence. Thus, by and large through operations of such forces the population in the long run could be expected to remain at the subsistence level on the average.

Malthus also developed a theory of underconsumption for drawing a conclusion that the situation could not improve even after internal production capacity in the society, through accumulation of capital, increases at a rate much faster than the rate of growth of population. He argued that as accumulation proceeds through foregone consumption by the capitalists, that is through lack of expenditure by the capitalists, the produce turned out by the additional capital would never be able to command enough in the market for repaying the charges for labour and for yielding appropriate profit to the capitalists. So to say, the additional demand for labour caused by increasing accumulation could raise wages, thus reducing the profit.

He argued that no nation could grow continuously by accumulation of capital, arising from a permanent demunition of consumption, because such accumulation being greatly beyond what was wanted in order to supply the effective demand for produce, a part of it would very soon lose both its use and its value and cease to possess the characteristics of wealth.

The situation is not so easily altered even when arguments used by J.B. Say regarding the demand inducing effect of supply of products is used. In a way Ricardo did suggest some arguments in this direction. He denied that per se money if matched by investment in additional circulating capital could result in any deficiency of demand. He also argued that if real wages rose in consequence of increasing investment the wants of consumers would simply be transferred with the power to consumption to another set of consumers and that the power to consumption is not annihilated but is transferred to the labourer. It was also argued that if wages should be raised this could not be more than a temporary state of affairs for as Malthus himself had argued population would necessarily catch up with the demand for labourer due to increase of income. Thus, stagnation could not be possible if growth of population was already bound by the growth of food output as Malthus had also stipulated in his discussion of population theory. Thus, in a way, Malthus used fully the theory of population for explaining the necessary advent of a stationary state.

In another sense, however, there was an element of political purpose in the theories of stationary state developed by the classical economists. In Adam Smith's case a conclusion of a stationary state in a closed economy was essential so as to build up pressure for expansion of trade and expansion of colonies. In the case of Malthus on the other hand, he used his logic of a stationary state so as to justify the payment of rent to the landlord as also to justify its progressive increase so that the expenditure by the class of landlords could compensate for fall in the effective demand occasioned by the per se money of the capitalists. In order that the pace of accumulation could be preserved and even expanded for which rent income of the landlord was essential. Malthus was also opposed to the abolition of the corn law which ensured continuous increase in the rent income of the landlords.

Ricardo also picked up the Malthusian idea of population growth dependent on the supply of agricultural produce for developing his own ideas regarding the directions through which the stationary state could be reached. Ricordo was concerned about the prevalence of the corn law, restricting the importation of food crops in England. He was, however, opposed to the corn law and believed that its abolition would benefit the British society by keeping alive the progressive state of the economy and by helping an escape from the ultimate stationary state.

He used not only Malthus's idea of population but also the ideas of law of diminishing return applicable to agricultural production. The rent

payable to the landlord was made dependent on infra marginal and the marginal produces of labourer, being essentially measureable by the difference of the two. It was also urged that as the marginal produce of labourer decreases with employment of more labour on land there was a tendency of rent to rise so long as more and more labour are put to agricultural production.

Ricardo used Malthusian population law for showing that wages paid to labourers in excess of their subsistence requirement would induce augmentation of labour supply, whereas such increases in the growth of labour supply would force bringing into cultivation inferior grades of land with decreasing marginal productivity of labour. The movement would ultimately stop when the marginal product of labourer is only equal to the subsistence wage. At that point no profit is left for the entrepreneurs whereas the entire surplus is earned in the form of rent by the landlords. It is at this stage, therefore, further progress is completely stopped and the rate of profit is reduced to nil.

Ricardo used this model for suggesting the need for repeal of the corn law as it would allow importation of corn at a cheaper rate thus avoiding the use of labour upto the point of margin of subsistence. Were this to happen, the rate of profit would continue to be earned by the capitalists and the progress in the economy preserved.

The use of the population theory was, therefore, crucial for the development of the dynamics of the economy by Ricardo. Ricardo, however, while writing the Principles of Political Economy and Taxation had to go beyond this and show that the rate of profit obtainable in agriculture should also be the rate of profit in all activities so that the stationary state which has reached according to the earlier logical arguments was essentially final and irrevocable unless steps for lowering the price of corn were taken.

In the Marxian economic system also the population played a role but he did not require the Malthusian law of population growth in his context. It was argued that the accumulation by the capitalists would in any case proceed in such a manner that a relative overpopulation would essentially be created for sustaining the tempo of accumulation in the capitalistic system. This would occur through changes of what he called the organic composition of capital in the process of capitalist progress.

In a significant way, therefore, population played a very crucial role in the economic theories of the classical economists. On the other hand, the contribution of the population to the development of economy and the society during those days did not follow the lines stipulated in those

theories. There was significant growth of population during the early stages of industrial growth; and to a large extent, the growth of population instead of hindering the growth of the economy contributed to it. The productivity of agriculture through technological development also occurred to such extent that there were never occasions when population outstriped supplies of food product in those society. On the other hand, though agricultural productivity continued to improve the growth of population on its own tappered of so that even the relationship between the growth of income and growth of population explicitly stated in the earlier theories was never realized.

Adam Smith's Wealth of Nations was not merely a treatise on economics but was also a manifesto for capitalism and individualism and laissez-faire economic system. It held out great optimism and a promise of a prosperous society which could be the consequence of the economic and political system implicit in his Wealth of Nations. In real life, however, notwithstanding the vigorous growth of the economy on the wake of the industrial revolution a considerable degree of misery and deprivation persisted. These were also subject of vigorous discussion in the latter half of the 18th century leading to rise of socialistic ideas at that time. Malthus's Essay on Population was principally addressed to such criticism of the classical economic thinking where he brought out the cause of misery and deprivation in the society not lying in the socio-economic institution but in their propensity to grow. The turn which the classical economic thinking took after incorporating the growth of population in the models of economic dynamics, essentially on Smithian foundation, was, however, totally different from the original Smithian perspective. In a way, it was totally contrary in that instead of the promise of prosperity and progress a dismal picture came out sharply. The Ricardian analysis also pointed out in the same direction so that the basic purpose of the classical economic writing contained in Smith's work was wholly lost. In another sense it was also a dangerous turn in that further extension of the line taken by Ricardo led to the Marxian system which prophesied collapse of capitalism due to force which it itself unleashed.

The economic writings which provided further direction to the growth of economic ideas, particularly the Smithian ideas of the efficiency of laissez- faire system were therefore the ones which veered away from Malthus and Ricardo to altogether different directions. Most pertinently, such writings wholly avoided national aggregative issues and issues of growth and dynamics. Emphasis was laid on issues of pricing and distribution and these became the main trend of economic writing in the

generation after the period dominated by Ricardo and Malthus. This shift of emphasis entailed the optimization bias in economic analysis.

Essentially the discussions of this period progressed by stages to show that under competitive conditions each individual, whether as a buyer of goods or seller of goods or whether as buyer of labour, of seller of labour receives just that which could not be improved in any other conditions of production and exchange. It had also entailed conclusions that under perfectly competitive conditions all factors of production (labour and capital) available for productive utilisation also find opportunities of employment of such order in return for which just remunerations are also received.

In a way, it provided the necessary rationale and logic for all that were promised in the original Smithian manifesto.

Since aggregative and dynamical issue were avoided population had no place in this framework. Individual consumers and labourers figure in these discussions but they appeared only as buyers and sellers and were shown to receive what they deserved. As it also promised full employment in return for remuneration which is justly allowable the issue of excessive supply of labour or of shortage of labour did not create any specific problem.

Amongst the neo-classical writers Marshal continued to keep his foot firm on most tenets of the preceding classical ideas. Thus, he also dealt with macro economic and global aspects of the economics. In this respect he also developed ideas about population which was nearly similar to Adam Smith. He believed that the societies progress over years through possibilities of increasing returns, which could materialize if population grew regularly. In this respect, therefore, he did not share the pessimism of the earlier classical writers like Ricardo and Malthus.

Population in the Neo-Classical Framework

Economic issues in the neo-classical framework of analysis was always raised in the form of issues of maximisation or optimisation. In this framework, it was possible to employ methods of calculus for drawing economic conclusions. As the tool was sufficiently general it was also used for answering economic questions of all sorts after posing the issues in such structures which allowed use of the tool.

Although issues of population did not enter directly in the main body of neo-classical economics,[2] discussion of the issue of population, in any case, came to be framed in the neo-classical framework of optimisation.

2. The mainbody of the neo-classical economics concerned with issues of profit maximization for individual establishments and of distribution of the income as between the agents involved in the production. Being primarily micro-issues, the question of aggregate population was never a part of the major issues.

Using the basic Malthusian relationships between output and population, under the new frame of analysis effort was made to find out whether optimum population could also be defined on the same lines as the other optimum categories were defined in economics. By this time, the ideas of increasing and decreasing costs associated with various types of economic activities were also consolidated, as being, so to say, the factors behind the shape of the output curve.

It was suggested that in a closed economy the size of the population and average man-hour productivity, with all other factors held constant, would have a functional relationship with such properties that a given size of population would result in a maximum man-hour productivity. It was also suggested that the characteristics of the relationship would be determined by the relative intensities of the downward and upward pulls on man-hour output curve by the two component factors: a decreasing return function for all resource gathering activities and an increasing return function for all other economic activities. It was further suggested that because of these characteristics, a graphic portrayal of the over all man-hour productivity function would take the form of an inverted bell shaped curve with a single optimum point.[3]

As such, a concept of optimum population was in keeping with the general neo-classical approach to economic analysis. For quite sometime, there was no overt objection to the stipulation of such relations in theoretical discussions.[4] As except the population figures, data in respect of economic activities were also not available the proposition also was never tested.

The neo- classical system was static and was focussed to establishing the optimality of any current situation. This also implied the establishment of optimality of the then current level of population. On the other hand, the population data which were available even during those days showed regular increases. Thus for establishing continuous optimality of the situation, it became necessary to hold that each level of population was optimum on the assumption that output per-head remained constant while population increased. With such a stipulation, the essential virtue of the neo-classical system, which was showing the

3. M. Gottlieb : The theory of Optimum Population for a Closed Economy · Journal of Political Economy. December 1945.

4. The idea of optimum population was suggested by E. Cannan in 1888. E. Cannan· Elementary Political Economy (Part 3) and A Review of the Theories of Production and Distribution in English Political Economy from 1776-1848.

uniqueness of the optimum point, was also lost. More importantly, as optimum came to be stretched over a range of population, a unique value for the size of the optimum population which the system had set out to establish could not be determined.

Thus, during the period discussion on population problem was largely focussed on a discussion on meaningfulness or meaninglessness of the concept of optimum population and on the various formulations of the relations in its context.

On the output side various categories like economic welfare, standard of living, real income, consumption output, etc.,came to be suggested for relating with population at various stages. On the side of the form of the relationships also various forms were discussed. In particular, the latter generation of writers emphasized that in all probability, an index of average man-hour productivity would be relatively insensitive to population changes throughout a middle range of population sizes so that there would be more likely an optimum zone rather than a point. It was also stated that the optimum was liable to be altered perpetually by the progress of knowledge and other changes; that it was never definitely established and was continuously shifting. With the theory of volatility there also developed a doctrine of active multiplicity or variety of causes which were so numerous, inter- locking and dynamic as to reduce it highly difficult if not impossible to extricate the effect of gross population size from other variables.[5] So to say, the period after Malthus down to the days of the great depression was devoted in respect of population issues only to discussing these matters which had in any case no policy implication whatsoever.

In a significant way, a change in the approach to population issue was noticeable generally after the great depression of 1930, and particularly after the publications of Keynes' General Theory. Keynes himself in the General Theory did not use any population category explicitly, but indicated the need for growth of population for escaping from stagnation of the western economics.

The discussion on population issue was most explicitly made after Keynes (using his idea) by Alvin Hansen. He elaborated, in particular, the factors and forces in the western world which could be held responsible for falling investment opportunities leading to chronic unemployment. It was argued that widening of capital would be a function of an increase in final output, which in turn would be partly related to an increase in

5. Myrdal, G., Population: A Problem for Democracy, Cambridge (1940).

population; that rapidly growing population would demand much larger volume of residential building construction than would a stationary population; that demand for housing called for a larger capital outlays.[6]

Myrdal also held explicitly that the expansionist Capitalistic system of private enterprises had one of its prerequisites a progressive population. He also held that a declining population would increase investment risks all around, and even apart from that, would lessen the demand for new investment.

After the Second World War, the population issues, particularly, the issues concerning the relationships between growth of population and economic development came into forefront. In 1949 the Population Commission of the United Nations recommended to the Secretary General that a survey of the existing scientific studies concerning the relationships between population trends and economic and social factors should be carried out and that summary of the findings of such studies with special reference to the problems of economic development should be prepared. The result of the study was published in a report named "The Determinants and Consequences of Population Trends". This report, in a way, initiated a spate of studies, and discussions on population issues in subsequent years.

The report devoted separate areas for discussions on the population issues of the developed and of the underdeveloped countries. The reason apparently for the separation was that in respect of the developed countries there was no unity among the writers about the effect of the population on economies of the developed countries. A part of this reflected the scepticism among the western economists which resulted from the earlier population theories of the neo-classical tradition with ideas of optimum.

In particular, there was some degree of agreement in the findings of most studies concerned with industrial countries that the influence of demographic factors was less important than the influence of other factors bearing on industrial efficiency, the development of capital equipment, the fullness of employment and the directions and pace of social change.[7]

The hypothesis that slow growth and aging of the population tend to increase the risk of structural unemployment was found less controversial. The study also noted that the question as to whether or not a large population would be favourable to higher level of per capita

6. A.H. Hansen: Economic Progress and Declining Population Growth; American Economic Review, March, 1939.

7. U.N. : Ibid., p. 261.

output in the long run was not unequivocally answered for any of the highly industrialized countries, and that difference of opinion appeared to result chiefly from the different weights which various analysts attached to certain possible advantageous and disadvantageous of a larger population.

In respect of the population issues for the underdeveloped countries the report was more forthright and unambiguous. It started with the assumption, based on the logistic law of population growth that the underdeveloped countries, which would necessarily, on attaining freedom, have a rapid industrial development, would face a very high rate of population growth at the outset. The report analysed the possible effect of the high rate of population growth in the initial phases of the development of the underdeveloped countries.

It recorded the general consensus that in such countries as India, China and Egypt, where natural resources are much scarce in relation to the size of this current population food problem would be aggravated by the rapid growth of population. It also recorded the general stress in the current writing that no appreciable progress in raising productivity and living standard was possible if the present population on the land increased substantially.

The more substantive part of the conclusion of this study related to the relationships between capital and investment and growth of population. Various studies which had provided estimates of the requirements of capital per person for raising the level of output for improving the standard of living in the different underdeveloped countries, were referred as a part of the study under this programme. It also emphasized that investment not merely in productive areas but also in the area of infrastructure development would be required in considerable extent for raising the living standard in the poorer societies.

It was then held that population growth in heavily population countries with a low level per capita income not only increased the quantity of capital needed for providing the growing labour force with a given per capita amount of equipment but also added to the difficulty of raising capital at a given rate. It was added that as the population grew the possibilities of capital formation diminished unless industrialization and agricultural improvement could keep pace; that otherwise, the expanding needs for good and other necessities would be met only at the expense of those slim resources which with a stationary population might have been used for the formation of fresh capital.

Reference was made to various writings which suggested that voluntary savings in underdeveloped countries would be insufficient to provide capital at a rate needed for economic development. A study by the Spengler[8] was particularly referred, which called attention to the fact that the rate of domestic savings in India as given in the United Nations report was 2 to 3 per cent of the national income, when an annual investment of 11 per cent of income was required for India for achieving a 3 per cent annual increase in per capi'a income with population increasing at a rate of 1 per cent per year.

The report also went into the various means by which savings in the underdeveloped countries could be increased, but added that the question remained whether the rate of saving and investment could be raised high enough by these means to provide a sufficient amount of capital for economic development of those countries where the needs are the greatest and particularly where population was growing rapidly.

This report also induced a revival of Malthusian ideas on population as also the ideas of optimum population for different countries. The subsequent theories did not use straightforward Malthusian idea of food supplies governing the size of population. By and large, the effort was to show how a bare subsistence level of income is preserved while the population is growing. In particular, it used the ideas that the rate of saving is inversely related to the rate of population growth as suggested in the United Nation's Report. The relations developed in most of these theories specifically determined how the rate of saving is affected by the rate of population growth and how given the rate of growth of population a rate of saving is ultimately determined which merely ensured a substance level of average income.

Studies, with a focus towards benefits of reduced population growth rate, covered many aspects. Estimates were prepared showing what rate of the national income would require to be saved for ensuring constant level of per capita income. A study by the United Nation itself brought out that for providing capital necessary for a one per cent population increase. 2 to 5 per cent of the national income should be saved.[9] Colin Clark estimated that for a country like India even with a constant population a rate of saving of 8 per cent would be needed for obtaining two per cent annual increase of income; and that if the population grows

8. Spengler· Economic Factors in the Development of Densely Populated Areas.

9. United Nations· Measures for Economic Development (1951).

at the rate of one per cent a rate of 13 per cent saving would be required for the same two per cent growth in per capita income. [10]

Spengler similarly presented the implications of a 25 year plan of economic development in an underdeveloped community and held that the plan would absorb 13.8 per cent of the annual national income during the 25 years period if the population increased at one per cent per year annually, and about 19.5 per cent if the population increased at two per cent annually.[11] Studies were also done showing how much economy would benefit if the fertility rate were to be decreased. Enke estimated that the worth of preventing a birth in a typical underdeveloped country was about 2.6 times the output per head.[12] The effect of change of age composition of the population consequent on reduction of fertility was also studied. Coale and Hoover estimated the gain of income per capita (adjusted for age-distribution) resulting from a 50 per cent linear reduction of fertility occurring over a period of 25 years in the Indian setting as about 15 per cent after 20 years following the onset of fertility decline and as about 40 per cent after 30 years, the difference increasing rapidly afterwards.[13] Study also of the effect of reduced fertility rate on the rate of saving was conducted. It was shown by Leff through a multiple regression study that high dependency ratios and ultimately high birth rates - were among the important factors which accounted for the great disparity in aggregate savings rates between developed and underdeveloped countries. It was suggested that high birth rate and dependency ratios in the conditions of most underdeveloped countries entailed a sub-optimal allocation of resources: that the dependents absorbed a large portion of the resources potentially available for increasing the stock of physical and human capital: and that there could be no possibility of achieving substantial increases in the savings rates unless birth rates were reduced.[14]

10. C. Clark: World Resources and World Population; Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources, Vol. I.

11. Splengler: Economic Factors in the Development of Densely Populated Areas; Proceedings of the American Philosophical Society, Feb. 1951.

12. Enke: The Economic Aspects of Falling Population Growth, Economic Journal 1966.

13. Coale and Hoover: Population Growth and Economic Development in Low Income Countries; Princeton University Press, 58.

14. Leff N.: Dependency Rate and Savings Rates: American Economic Review, 1969 (December).

Population in Modern Theoretical Setting

The relationship between population growth rate and savings rate which figured so prominently in the above discussions about the future of the underdeveloped countries has its root in the relationship between the rate of savings and the rate of economic growth. This relationship came up in the discussion about the economic growth which was initiated after the publication of Keynes' General Theory. In the Keynesian analysis achievement of full employment equilibrium required a commitment of a certain amount of net investment so as to bring total effective demand to the level of full capacity utilisation. But as the new investment would change the objective situation on which the current equilibrium were to be based - through increase of productive capacity and the stock of capital— the very achievement of the equilibrium at one point of time, far from being the end of the story opened up a whole series of questions on how full employment equilibrium could be maintained in the following period.

In a simple variant of a theory of growth it readily came out that in order to maintain equilibrium in the long run, i.e., in order to keep the productive capacity and the effective demand equal to each other, new investment would require to expand through time according to a given percentage rate annually. The given rate was obtained as a ratio of the rate of savings and the capital/output ratio. The net income, consumption and the stock of capital were also required to grow at the same rate.[15]

In this formulation the savings rate required for maintaining equilibrium over time turned out proportional to the rate of economic growth, the constant of proportionality being the capital/output ratio. It also followed from the relationship that for higher rates of economic growth a higher rate, of savings would be necessary. The exact rate of saving needed for a given rate of growth was also easily obtained as soon as the value of the capital/output ratio was known. As a matter of fact, these were exactly the relations used in the suggestions about the requirements of savings for supporting rate of economic growth in the underdeveloped countries. Again keeping only such relations in view, investigation of the relationships between rate of savings and the rate of economic growth, it is revealed that the output/labour ratio in such a situation would remain constant so that the realised growth rate of output and the expected growth rate of output would not differ. In such a

15. Domer E.: Capital Expansion, Rate of Growth and Employment; Econometrica, 1946.

situation the realized savings rate and the expected savings rate are also equal so that the total realized saving and the total investment are equal.

It also follows that higher the rate of growth of labour force, the higher is the rate of growth of equilibrium income, and higher also is the rate of saving, being proportional to the rate of growth of income. The numerical relationship between the rate of growth of labour force and the rate of saving in the economy is also rigidly fixed, depending upon the given value of the capital/output ratio. Any value of the savings rate which is different from the one determined in the above manner is untenable and is liable to change, regardlessly whether the difference is in the positive or in the negative direction. In a way, therefore, one could as well argue that the savings rate is essentially determined by the population growth rate and increases, for a given value of the capital/output ratio with the increase of the latter.

In the above growth formulation the capital/output ratio was always taken as a technological parameter, so that the effect of population growth on the rate of economic growth could be expected to operate through the rate of savings. On the other hand, the population growth rate, being the determinant of the rate of growth rate labour force, could also be expected to determine the rate of unemployment while the economy progressed along a given growth path in which only the saving rate and the capital output ratio played their part. Most pertinently, if the actual labour force growth rate was lower or higher than the growth rate of income determined by the current saving rate and the historical capital/output ratio, the question whether an economy could still grow at a rate given by the ratio of the saving rate and the historical capital/output ratio was not answered in the formulation. If the actual labour force growth rate were higher than the estimated figure of income and capital growth rate, unemployment would invariably result should a fixed capital/labour ratio occur in the production process.

On the other hand, if, even with the above conditions, full employment is preserved the average capital/labour ratio would fall because there would not be enough capital to provide each new entrant to the labour force at the old rate. Presumably with smaller support of capital per head than the previous cohort of workers the new entrants would also produce less per head than the others so that there would also be a fall in all probability in the average output per head in the economy relative to the output per head which were to result if the new entrants obtained equal support of capital per head as the earlier cohort of workers. Thus, the actual rate of economic growth would also be less than the rate which

would have emerged if the labour force had grown at the same rate as the capital, i.e., if the capital/labour ratio had not changed.

This would also have brought down the realized amount of saving as also the rate of saving, the latter being proportional to the rate of income growth according to the formulation of the above growth theory. Such a situation could not, however, persist as the total realized savings would be less than the amount of investment needed for supporting the expected capital growth in terms of which the present analysis started. Thus such a situation could not also be an equilibrium situation and would, therefore, be unstable.

Stability is, on the other hand, ensured if the labour force growth rate and the expected capital and output growth rates were equal. Thus with no growth of labour there should be zero savings rate. If a society still saves and invests the capital/labour ratio would increase leading to, in the absence of technological improvement, fall in the marginal productivity of capital and the rate of profit. If a positive savings rate still continues, in the course of time the marginal product of capital would also become nil leading to disappearance of profit altogether and motives for further savings, at which level there would be no further saving in the society. Thus under competitive conditions the saving rate could also increase with the increase of the rate of population growth rather than decrease as suggested by the other set of theories referred earlier.

In a way, there is nothing extraordinary in the above relationship. If capital/output ratio remained constant in the process of growth it would not matter at what rate output individually grows so long as capital also grows at the same rate. Thus the exact numerical rate for the growth of these two items would be determined by the growth of some other item. As the labour is the only other item involved in the process of production the absolute growth rate of labour would essentially determine the exact growth rate of output or capital. The conclusion is not changed when stipulation about the constancy of the capital/output ratio is withdrawn. In effect, the growth of rate of labour would determine the growth rate of output so long as a rigid relationship between capital and output, independent of labour is stipulated, either from the side of saving or from the side of technological requirement.

In the above formulation the supply of labour force has been taken as the basic determinant for the rate of growth of output. It is, however, meaningful to use, instead, a concept of effective supply of labour, taking account of the growth of the productive capacities of individual labour,

which is acquired independently of the growth of capital and output. As growth of capacities of the above sort in effect increases the supply of labour in efficiency units, in real life it would be the growth of labour in such units which would determine the rate of growth of output and capital. Numerically the rate of growth of labour in efficiency units would be equal to the rate of growth of physical labour and the rate of growth of the efficiency of individual labour. If the latter is nil, the rate of growth of output comes to be determined wholly by the rate of growth of physical labour.

Harrod used the above rate of growth of effective labour as what he called the natural rate of growth of the economy and built up his ideas regarding the progress of societies by investigating the consequences of divergence of movement of the economy from such a natural growth path.[16] In the Harrodian formulation the issues was posed as if there were two independent rates of growth for the economy, one determined by the growth of effective labour and the other by capital, output and saving relations, which needed to be equal for an equilibrium progress of the economy. So long as these two rates are treated as independent of each other their equality could only be accidental and divergence more frequent. For this reason the Harrodian system was also said to be balanced on a knife edge.

The subsequent discussion in the area of economic growth concerned with finding how the natural growth path could also be the steady state growth path for an economy, i.e., how the natural growth rate could be expected to determine the behaviour of the other elements of the economic system so as to ensure the progress of the system along the natural path.

There has been great difference among the economists about the process through which the economy could be expected to move so that the growth might occur along the natural path, established by the growth of effective labour, but about the acceptance of the primacy of the natural rate over all other economic variable there has been none. In one school of thought it has been shown that the savings rate, through the distribution of income, is adjusted so as to be consistent with the natural growth rate; in another it has been shown that the capital/output ratio varies so as to be consistent with the growth rate.[17]

16. Harrod; R.G.: Towards a Dynamic Economics, Macmillan, London, 1951.

17. The major division has been along what has been Neo-classical and non-neoclassical approaches; but within each school also there are significant variations in the approaches.

Population Growth and Savings Behaviour

The behaviour of savings by individuals and corporate bodies and that for the society as a whole are governed by different factors. An individual is distinguished from a corporate body in that the former has a fixed life span, while the latter has indefinite life span, though both are decision making units in respect of saving. A society shares with the corporate bodies the quality of indefinite life span, but does not possess the decision making qualities. The savings by the society, is, therefore, merely the aggregate saving of the decision making units in the society.

An individual has a given life span during which he is, for some time a saver, and for some other times a dissaver. Thus from the side of the individuals, the aggregate gross social saving during a given year is given by the savings by all the savers, less the amount of dissaving by all the dissavers during the same year. A positive social saving would accrue if the total saving during a year by the savers is larger than the total dissaving by the dissavers during that year.

In the capitalistic societies the corporate business houses which earn profit also retain a part of the profit for further investment. The houses distribute the remaining sum among the share holders which forms the income of the share holders. The share holders are private individuals, and therefore, this part of the income is also taken account by them while deciding the amount for saving or dissaving during a year. On the other hand, capital assets formed under the corporate houses are also owned by the private individuals so that the capital accretion though occurs as a free decision of the corporate houses, form a part of the overall saving decisions of the private individuals. Physically, the assets remain with the corporate houses, whereas the ownership structure of the assets among the private individuals change depending upon the savings and dissaving behaviours of the individuals.

Thus, if the ownership of the corporate assets is the only form in which savings can be held by the private individuals the amount of saving in the society is fully determined by the proportion of profit retained and invested by the corporate houses. Behaviour of saving and dissavings and the corresponding propensities of savings of the individuals decide, in this case, only the ownership structure of the assets and not the quantum of saving.[18] On the other hand, the capital asset with the corporate sector is the accumulated saving of the private individuals so that in virtue of

18. The additional capital asset with the corporate sector will be matched by additional liabilities in the form of fully paid up bonus shares to the existing share-holders. The dissavers among the individuals would liquidate their holdings (original and bonus shares) and savers would buy them leading to changes in the structure of ownership but without any effect on aggregate capital formation : This is one of the ways in which the Pasinetti proposition may hold true. Pasinetti Growth and Income Distribution, Cambridge University Press 1974, p. 106 f.

their savings and dissavings behaviour only the corporate capital is accumulated. Looking from this side, therefore, the behaviour of private individuals fully determine the aggregate asset formation during each year in the society.

Some aspects of the behaviour of annual savings of the society can be easily seen from the side of the behaviour of individual savers and dissavers. The individuals may save merely for supporting their own lives after retirement. In this case each individual accumulates each year a sum of money for the entire duration of this active life and uses this sum for surviving during the remaining years of his life. The aggregate saving effect of such a situation can be visualized in the following illustration.

Aggregate saving is generated in the above situation as if a group of person, takes an endowment policy to be matured after, say, 30 years. Each member contributes to the policy fund for thirty years. If such a scheme starts in a given year, then for the first thirty years there is no withdrawal. During the fund's life a sum is accumulated in which a group contributed for 30 years, another for 29 years, still another for 28 years, and so on. On the 31st year the contribution made by the first batch is withdrawn; during the same year the fund also receives the annual contribution from each individual contributor. Thus the addition to the fund in the 31st year is the difference between the sum collected during the year and sum paid out to those who completed 30 years.

If all active persons in the society are members of this fund then the total amount collected during a year is the product of the contribution per head per year and the number of individuals of the active age group. The withdrawal from the fund amounts to the product of the contribution per head per year, the number of individuals who joined the fund 30 years ago and 30 which is the number of years they contributed to the fund. It will now be seen that with a constant population the annual social saving is also constant. If it is also assumed that the total number of persons joining the fund each year is also constant, being of the same age group and forming a constant faction of the total population, the aggregate annual social saving after the 30th year of the setting of the fund is really nil. In this regard, it is not further necessary to assume that there is no mortality during the active life period of the individuals. If there is any death in between the successors will take away from the fund the amount contributed by the deceased before expiry.

On the other hand, a positive saving as also a growth of saving are clearly indicated when the population grows. As the population grows, with a constant proportion of the population in the active age group, the

number contributors increases steadily. The withdrawal from the fund in a year is determined by the number of persons who joined the fund thirty years before, whereas the collection during the year is determined by the total number of persons in the active age group. The latter gets inflated by the growth of population for 30 years, relative to what it would have been without any growth of population.

The withdrawal, however, is not affected by the growth of population during the intervening 30 years. Thus so long as the population continues to grow the difference between the collection in any year and the withdrawal during that year increases from year to year. This is a positive effect of the population growth on saving in any society.[19]

It can also be shown that if the population grows at a constant rate and also if a stable population pattern exists, the annual growth rate of saving will be exactly equal to the growth rate of population. As in the absence of technological improvement, the output would also increase at the same rate, the conditions for steady state growth is fully realized in such a situation, i.e., both the capital/output and savings ratios would remain constant.

In an individualism-based-society, where individuals are expected to take decision only in consideration of their self-interest, saving for support of individuals life during the retirement period is a necessary motivation. In the extreme case, when individuals also lose all urge for leaving assets for bequeathing, the above motivation for saving may even turn out as the only motivation. In such a situation the quantity of saving generated annually by a society is fully determined by the rate of growth of population.

However, in a situation where the natural growth rate of the economy is larger than the growth rate of the population due to improvement of productivity per person, and when steady state growth conditions prevail, the saving rate will require to be proportional to the sum of population growth rate and poroductivity growth rate. and not merely to the population growth rate. In effect, the equilibrium value of the savings rate turns out to be larger that what the value would have been when the productivity growth rate is nil. The additional saving necessary for raising the savings rate appropriately is no longer relatable to the growth of population on the basis of the process discussed above.

The equilibrium value of the savings ratio, under steady state growth situation, increases with increases of productivity of labour only with a

19. Kuznets uses the above sort of logic for showing the effect of population growth on savings; Kuznets, Economic Growth and Structure, p. 132; Heinmann Educational Books Ltd.

constant capital/output ratio which is also taken as a condition for steady state growth situation. It has, however, been revealed in various studies that as the economy progresses the incremental capital/output ratios vary inversely with the rate of growth.[20] This would mean that the value of the savings ratio in different states of growth would not increase proportionately to the increase of the growth rate of the economy. This in effect is one of the conclusions derivable from the studies relating to the contribution of the residual factor to economic growth.

Kuznets[21] has provided some indication of the rate of saving which really corresponded with the growth of productive capacities in the developed countries. The rate of gross capital formation ranged from over 10 per cent to over 20 per cent in those societies over the greater part of their growth process; that of net capital formation from about 5 to 15 per cent. The capital formation included residential and related housing, which accounted for three to four tenths of the total, and net changes in the inventories, which were hardly productive tools that embodied the benefits of technical progress. He added further that if capital formation were to be limited to the strictly productive tools that embody modern technology, that is to industrial plant and equipment, the proportion of annual additions in national products might be no more than 5 to 7 per cent.

From this analysis of data Kuznets also drew a conclusion which was reached earlier in the analysis of economic growth behaviour vis-a-vis the contribution by different factors of production (residual factor case). He added that if technological charges permit huge additions to output with only minor additions to reproduceable physical capital, it might be that the essential investments were largely in human beings, the active agents in society, not in sticks, stones and metals .[22]

Essentially two conclusions emerge. First, there is every ground to believe that the population growth induces growth of savings at least at the same rate as the rate of growth of population. Second, if the natural growth rate of an economy is larger than the growth rate of the

20 Leibenstein: Incremental Capital Output Ratios in the short run, Review of Economic Statistics, February 1966.

Patel, S.J.: A Note on the Incremental Capital Output Ratios and Rates of Economic Growth; Kyklas 1968.

21. Kuznets: Economic Growth and Structure, Ibid, p. 39.

22. Kuznets: op. cit., p. 55.

population, the value of the equilibrium ratio of savings to income does not require to rise proportionately to the difference between the natural growth rate and the growth rate of population. That is to say that from the side of growth of population no adverse effect on the growth of output is easily traceable, either theoretically or empirically. The strength of this conclusion has now been realized also by the neo-Malthusians who at one stage argued vigorously using various economic models, about the adverse effect of population growth on the rate of growth of the economy. In a recent paper Leibenstein who has been, so to say, one of the most ardent neo-Malthusians, with his critical Minimum Effort Thesis, Wrote;[23] 'In an age when there is unusual concern about the population explosion one would think that the concern arises as a result of a solid understanding of the consequences of population growth on the economy. However, much of what is normally understood about the consequences of population growth depends upon the classical approach to the problem. This primary mode of analysis involves inferences about output based on the impact of population growth on the ratios of the traditional inputs of land, labour and capital. Only in recent years have we had hints that we may be on the wrong track'.

Population Growth and Savings in India

Indian data on saving present a totally different picture from what is visualizable on the basis of the previous discussions. Contrary to the arguments provided by the neo-Malthusians savings rate in India did not decrease with the growth of population. The rate as a matter of fact increased significantly. The increase also did not conform to the other stipulation that the rate of saving is proportional to the rate of growth of population. In India, on the other hand, while the rate of growth of population remained steady (about 2.2 per cent per year) the rate of saving increased steadily from year to year rising to 23 per cent in 1981-82 from less than 10 per cent before 1950

According to data provided by the C.S.O. the percentages of income saved in 1950-51 and 1981-82 were 10 and 23 per cent respectively. The index of saving in 1981-82 with 1950-51 as base was therefore 2.3 times larger than the index of income in 1981-82 with the same base. The index

23. The Impact of Population Growth on Economic Welfare-Non-Traditional Elements Included in Rapid Population Growth: Consequences and Policy Implications; John Hopkins Press, 1971; p. 175.

of gross domestic product in 1981-82 was 304 so that the index of saving in that year was 700. This yields an annual growth rate of saving of the order of 6.5 per cent. With population growth rate of about 2.5 per cent per year, the growth of saving per person in India during 1950-51 to 1981-82 was about 4 per cent per year.

There are two interesting aspects of the above fact regarding the saving behaviour. A rate of growth of saving above the rate of growth of population would mean that the saving during the working life time of an individual is not spent during the retirement period, but left for bequeathing. Moreover, as the asset per person is steadily rising in this process, it also follows that the asset left by an individual at the time of death increases with the passage of time. The second aspect is that this high growth rate of saving per person occurred even though the per capita income increased during the period at about only one per cent per year. This means that a large part of the increase of per capita income was saved.

Relevant data for the period 1970-71 to 1980-81 are available. During this period the per capita income increased annually at the rate of 1.12 per cent; during the same period per capita private final consumption expenditure increased at the rate of 0.7 per cent per year.

Savings in India has been primarily a household affair. The proportion of aggregate saving by the household in the total domestic saving in 1970-71 was about 75 per cent. The proportion increased to more than 80 per cent in 1980-81. In contrast, the personal saving was only 10 per cent of the total savings in the United States during the period of 1929-1940 and 13 per cent during that of 1946-52.[24] Thus, the propensity save of the Indian households and the factors determining the propensity are matters for analysis, being of an extraordinary character.

Evidently, the utility function of the Indian households is different from the utility function commonly described in economic literature. The savings in this society is neither residual, nor a methodology for ensuring old age and post retirement support in life,[25] nor even for maintaining a desired standard of life during periods when the current income is

24 Tarashis, L: The Flow of Business Fund, Consumption and Investment; in Post Keynesian Economics (Ed: Kurihara), George Allen and Unwin Ltd., London 1962, p. 365.

25. This is the principal motive for saving used by Modigliani and Brumberg in their development of consumption function. Modigliani and Brumberg: Utility Analysis and the Consumption Function in Post Keynesian Economics, ibid., p. 391.

inadequate for supporting that. Asset-gathering by individuals itself becomes in this society an objective, maximizable subject to income and requirements for physical survival in the life time.

For an individual, however, such a utility function is not sufficiently rational in that the saving is undertaken without any use for him. The individual a masses assets during his limited life so that more assets can be left behind.

In a way, the situation makes sense only the context of the utility function for the Indian family system, with the family understood not merely in a current frame as a collection of individuals but as a body surviving beyond the lives of individual members. The concrete form in which a family is alive at any point of time is in the assets and in the members. It lives beyond the lives of a current generation of members only in so far as it leaves behind both human members and physical assets. Its strength, so to say, then lies in the size of assets and in the size of its members at any point of time.

Significantly, therefore, there is an essential correlation between the population growth and the growth of assets in this institutional framework. Each surviving member in the family not only adds to the assets but also tries to leave behind some body who will own the assets and ensure the survival of the family.

Concern for the survival of the family as a motivation for having children was found most predominant among the married women and men in the Mysore population study, conducted jointly by the United Nations and the Government of India.[26] Under this study's programme a specific fertility and attitude survey was conducted in the State of Karnataka covering both rural and urban areas. Questions were asked in this survey for finding out whether or not the respondents desired more children in their own families, as well as their opinion concerning the ideal size of family. Motives of persons who desired more children were also ascertained through series of questions.

Eight possible advantages of having children were considered for evaluation: to make home happier; to ensure family survival; to be taken care of in old age; to increase family income; to avoid Community Criticism; to follow Community Pattern; to follow example of friends and relation; to get fair share of family property for children. In the Bangalore City 86 per cent women respondents with at least one child

26. United Nations: The Mysore Population Study; United Nations Department of Economics and Social Affairs, New York 1961.

and 89 per cent similar male respondents desired more children to make home happier; 71 per cent women respondents and 73 per cent men respondents desired more children to ensure family survival. To increase family income as a cause for desiring more children was suggested by 44 per cent women respondents and 44 per cent male respondents.

In the rural (plain) areas also the structure of response was similar. 80 per cent women respondents and 93 per cent men respondents indicated their desire for more children to make home happier; and 84 per cent women respondents and 93 per cent male respondents indicated their desire for more children to ensure family survival. The proportion desiring more children to increase family income was not high in the rural areas also (54 per cent among women and 55 per cent among men).

In this survey the respondents were also asked to indicate their most important motive for desiring more children. Among the male respondents, both in the urban and rural areas, the motive to ensure family survival was the most prominent (24 per cent in the urban areas and 35 per cent in the rural areas).[27]

In a way, this motive for family survival could also be seen as a sufficient factor determining the fertility behaviour in India. Data in this regard, are also available in the Mysore Study Report. It is revealed that the mean number of children born alive per ever-married women in the rural and urban areas were respectively 3.5 and 3.9 where as mean number of living children for these two areas were 2.4 and 2.6. It is also revealed that in the rural and urban areas the mean number of children born alive to the ever- married cohort in the age group of 35-44, which is the last phase of the female reproductive life, were 5.1 and 5.6 respectively, whereas the mean number of living children to this cohort in the two areas were 3.5 and 3.9. The mean number of living children for cohorts in age group decline with further increase of age; for the cohort in the age of 65 years or above the figures were 2.4 and 3.2 for the rural and urban areas.

In the Indian cultural setting families survive through male offspring, as the daughters are married off in other families. Thus each family, for its survival, must leave at least one living male offspring. With the mortality experience of the rural and urban areas, this would also mean that in a family at least two male birth must occur so that the probability of one surviving male offspring is reasonably high. In a way, with these considerations the minimum number of children that must be born alive

27. United Nations: ibid., p. 145.

in a family turns out on this basis as four. The mean number of children born alive per ever-married women in the age group of 45 or above was around 5 in both the rural and urban areas. It would be noted that the above mentioned size of four as the minimum number of live children will be reached at individual family level so long as the probability of death of a son born alive before the death of the father is not zero.

Most significant data for consideration in the above regard are the infant mortality rates. The number of male children dying before attaining an age of one year per thousand born was 284 in 1881; 273 in 1891; 285 in 1901; 290 in 1911; 249 in 1931; 190 during 1941-50; 153.2 during 1951-60; and 135 during 1961-70. Interestingly female infant mortality rates have been always less than the male infant mortality rates.[28] During the decade of 1961-70, the infant mortality rates per thousand live births were 15 in Japan, 10 in Switzerland, 19 in UK, 20 in France, 21 in USA, 26 in USSR and 48 in Ceylone.

The Mysore Study also revealed that the size of the family in the rural and urban areas was not totally unplanned. In the survey opinions concerning the ideal size of the family were obtained from married females and males. Taking the data for Bangalore City, the mean numbers of children suggested as desirable by the married males and females of different age-groups were : 3.6 by women of the age group 18-21; 3.6 by women of age group 22-25; 3.9 by women of the age group 26-29; and 3.8 by women of the age group 30-33; 3.7 by men of the age group 24-29; 4.2 by men of age group 30-35; 4.2 by men of age groups 36-41 and 4.1 by men of age group of 42 and above. The mean number of living children per ever-married women of the ages of 45 years or more in the Bangalore City was found 3.5. The interesting part of the data is that both in respect of male and female, the number suggested by the respective group does not vary much with the age of the respondent; and that the actually established size has been slightly low but very close to the desired size.[29]

The above, in a way, sufficiently demonstrates the basic motivating forces determining the economic behaviour in India. The pattern is not similar to the one usually held in economic analysis of the western market oriental societies, and also to the one usually assumed in the economic analysis of the underdeveloped countries like India. Nevertheless, it has

28. Data taken from the publication, India's Population: Aspects of Quality and Control Vol. I by Ashoka Mitra; Abhinav Publications: New Delhi 1978.

29. United Nations, op. cit., p. 151.

its own rationality and within the framework of the field of operation it is pervasive and imposing. Basing on the socio-cultural and traditional values of the society, these forces determine both the economic and the demographic features of the society so that an equilibrium in a global framework is established, which could be dynamically highly stable.

As the structure provides for increasing rate of assets per unit of population, from the side of economics, the survival of the population has never been a problem. Over the ages, the population, therefore, has consistently grown; its growth was arrested only by mortality, morbidity and such other features.

Additional Aspects of Population Growth and Asset Formation in the Indian Institutional Framework

Saving per family is an independent objective but has significance only in the event of the survival of the family. The saving in each year is the surplus of income over expenditure so that with given income it increases only with decrease of expenditure. The expenditure in the family in such an institutional framework is largely for maintenance and subsistence of the members of the family. Therefore, with given income, saving is increaseable only at the cost of health and nourishment of the members of the family. It thus also follows that indifference in the latter regard, might, affect the prospect of survival and growth of the family. In a way, the two objectives could conflict under certain circumstances.

The conflict shows up most pertinently when the level of economic productivity is very low. With a correspondingly low level of income per family, the twin pressure of physical asset building and of leaving successors behind, invariably reduces the family's standard of living to bare necessities with telling effect on the health and nutrition of the members. The effect is most severe on the children and the women who require special nourishment - the former for supporting the needs of a growing body and the latter for feeding the children after their birth. The result of this neglect increases the mortality rate, leading to pressures for higher fertility among women. Thus on the one hand, the women are required to bear many children, due to higher mortality rates, and on the other their health suffers due to lack of nourishment, leading further to deterioration of the health of the children and to larger infant mortality rates.

The crude death rate in India at the turn of the century was around 40 per thousand. During the period of 1901-1970, the crude death rate declined to about 20 per thousand. Significantly, the level of 20 per thousand was reached in the 1950's, and thereafter it remained nearly steady.

The first major improvement in mortality occurred during 1921-31 and continued till 1951 with the control of country-wise epidemics and pandemics. The second accelerated stage of improvement came in the early fifties with the taming of malaria and other wasting diseases and with the control of infections. These causes of death are exogenous to the individuals and their control is also social.

The other causes of death are personal in that escape from disease and cure from disease depend upon the health conditions of the individuals and upon their capacity to withstand the effect of the diseases. In this regard, health and nutrition of the individuals play the most vital role.

The stability of the mortality rate at the level of twenty during the Sixties and Se--nties - after the effect of social control spent out, therefore, indicates that during the whole period conditions of health and nutrition in the country did not improve much.

A new sort of vicious circle thus has developed in India. The urge for assets and successors has led to, with a low level of economic productivity, bad health and nutrition conditions; which, in turn, increased the mortality rate and correspondingly the birth rate so that the probability of having a living male son was always positive.

The birth rate and the size of the family have remained tied to the last requirement in most cases by deliberate planning and decisions. Thus, there is also ground for believing that reduction in the mortality rate would bring down the fertility rate significantly in India. Therefore, the improvement in the health and nourishment of the children and women, should be expected to contribute to the reduction of fertility rate in a significant way.

The crude birth rate in India in the latter part of the 19th century was of the order of 50 per thousand, and the death rate of the order of 42 per thousand. Around the year of 1950, the birth rate came down to about 40 per thousand.[30] During this period, the death rate declined more sharply to about 20 per thousand. Thus, though both the rates declined, the birth rate did not decline in the same proportion as the death rate. This behaviour, in a way, is not fully in conformity with the suggestions made above.

30. Data taken from the monograph by Ashoka Mitra, ibid., Vol. I.

The birth rate in India, in so far as dependent on considerations of family's survival, would be expected to be affected more by the behaviour of the infant and child mortality rate than by the behaviour of general mortality rate. This aspect has been brought out significantly in a study by the Registrar General's Office. It was found out in the study that about 66 per cent of the variance in the crude birth rate among different States is explained by the variation of infant mortality rate among the state. The latter also explains 64 per cent of the variance in the gross fertility rate, and 67 per cent in gross reproduction rates.[31] In the area of infant mortality on the other hand, the decline in India has not been proportional to the decline in the aggregate mortality rate. But most importantly, the absolute value of mortality rate is still very high to affect the fertility behaviour in the country which is predominantly influenced by the consideration of family's survival. It also follows that the most important parameter for controlling the behaviour of population in India is the infant mortality rate more than anything else.

The issue of infant mortality rate brings us back to the question of nutrition in a more pertinent manner. The Registrar General's Office conducted a Survey of case of infant death, and found that in Madras and Bombay (1966) the largest proportion of the deaths could be attributed to malnutrition of the mother and the baby.[32] The weight of this factor in the infant mortality rate will also become more and more as the exogenous causes of death - epidemics, infectious - lose importance after better social control. In a significant way, such a stage has been nearly reached in India; and therefore, further reduction of infant mortality rate has to depend on improvement of health and nourishment of the population generally, and women and children particularly.

This aspect opens up a new dimension of human resource development programme. It is now obvious that socio-economic development in India has to base on comprehensive development of human resources, covering the aspects of health and nutrition as also of the productive capabilities of the individuals. In a way, it brings out the extreme dependence of socio-economic growth and development process on the basic manpower abilities and qualities, one of which covers the physical vigour and strength of the body and the other the skill and transformation abilities of the individuals.

31. Sample Registration Bulletin, Vol. IX, No. 1 (January 75) and Vol. IX, No. 2, April 1975.

32. S.R.S. Analytical Series, No. 1, 1971.

The effect of the neglect of human resources development on the socio- economic life process of India is also now apparent. The Indian Society - whose physical expression is its population - with its extreme urge for growth and expansion, and also with its inordinate capacities for translating the urge into action has grown into a size which is itself deterrant for further growth. It is also a deterrant for survival because the organs of the system which support the growth are also inadequate for the size which the body has acquired in the process of growth, with the result that the body itself is now in the process of decay and death.[33] The progressive deterioration of health and vigour of the population, taking away in the process the elementary strength to remain alive and to survive normal diseases to which bodies are prone, the steady change of the sex-ratio against the females with its effect on the future reproductive activity of the society, deterioration of the skill and ability of the population for transforming the natural resources to useful goods, increasing lack of integration among the members of the community and depletion of non-renewable natural resources which are needed for supporting life, together with progressive ecological imbalance are now acting to arrest the further progress of this society.

Significantly, even in the world outside India, the issues of population are now being discussed on these lines. The previous concern that the growth of population arrests the growth of the economy, and ultimately leads to conditions of stationary economy at the subsistence level of productivity, on a Malthusian or Neo-Malthusian on path, has altogether been given way to more sensible approaches to population problem. It is also now appreciated on the basis of the productivities achieved to the agricultural field in most under-developed countries that shortages of food might not ultimately be the cause for economic and population stagnation.[34] Instead, the debiliting effects of family size, child spacing etc., on the health and intelligence of the children and on health of the population in general are being emphasised towards development of good population policy in the societies.[35]

33.The extinction of the mamooth is also attributed to such a cause. It did not die because there was no food available, but because it lost the capacity to acquire food with its size.

34. See for instance the paper by Fisher and Neal Potter: The Effects of Population Growth on Resource Adequacy and Quality; and that by T.W. Schultz : The Food Supply Population Growth Quandry: published in "Rapid Population Growth—Consequences and Policy Implications" by a Study Committee of the National Academy of Sciences, U.S.A. John Hopkins Press, 1971.

35. J.D. Wray: Population Pressure on Families and John Cessel: Health Consequence of Population Density in Rapid Population Growth, ibid.

Population Policy Issues

A population policy for India, drawing on the various aspects of the programmes for human resources development, which have been discussed above could be even sufficient from India's long term point of view. Indian population size, and its rate of growth, as has been stressed earlier, do not compound the Indian economic problem. The rate of growth of food production during the last 30 years has been larger than the rate of growth of population. The current level of output per acre and the average level of knowledge embodied in the current agricultural technology are very low so that scope for further increase of output per acre through improvement of agricultural technology, knowledge regarding which is currently available, abundantly exists for supporting further rise of population in the country.

The saving per person per year also increased leading to increase of capital per man in the country during the last thirty years when the population growth suddenly accelerated. In any case, with a growth of capital of the order of 7.5 per cent per year and a growth of population of the order of 2.5 per cent per year there could also be no ground either for unemployment or for inadequate growth of per capita income during the last thirty years, or also for the persistence of poverty. In relation to the growth of population economic resources were, so to say, adequate for improving progressively the standard of living of the population.

The current rate of exploitation of the non-renewable natural resources is not very high so that, given the stock of such resources, there is also no apprehension of their being exhausted quickly on account of the large population. On the other hand, there is also ground for feeling that the exploitation of some of the resources, like coal and iron, could be increased for improving the level of living of the current generation of the population. With all these evidences there should be no reason to believe that external barriers have been encountered yet for being concerned about the present size and the rate of growth of the Indian population.

On the other hand, there are adequate grounds for being concerned about the Indian population from the side of the future of the Indian Society. A society survives in its population and ideas and ideals, but concretely in its population. In the past, faced with widespread uncertainty about life due to high mortality rate, the Indian Society survived through high level of biological productivity. But this has also gone against it in that in the process it has not only sacrificed the health and vigour and correspondingly the economic productivity of the

population but also the capacities for survival in the future through progressive decrease of female to male ratios.

A population policy, as a part of a programme of human resource development essentially aims at repairing this damage and at restoring the health and vigour of the population. In concrete terms, it should aim at improving the health and nourishment of the children and the women particularly, and of the population generally through meaningful medical and other programmes. To the extent, such a policy reduces the infant, child, and female mortality rate in the society, it will also reduce the psychological need for high reproduction rate, and expectedly also, the birth rate in the families. The probability for the latter to happen is also quite large, for the desire for survival of a family and of the society is satisfied both with a higher rate of population growth as also with a low rate. The high rate, till this time, has been essentially forced in this society as the safest answer to the widespread uncertainty associated with the physical survival of the children.

To sum up, there is very little ground for holding the Indian population problem as an economic problem. If anything, the population induced relations in India have been most conducive to economic growth process. The resources released by the households were capable of sustaining a much higher growth rate of income than was achieved in the country. In one sense, therefore, there are self-sustaining characteristics in the Indian social/demographic relations; in particular, if the rate of economic growth, which it is capable of inducing with the savings behaviour, had materialized through appropriate management and policy formulation, there were to be neither the problem of unemployment and nor of poverty, nor even of a high birth rate, for a high growth rate of income there could be enough resources for taking care of the problem of health and mortality. In this sense, the relations could be even more than self-sustaining; with a continuously rising rate of saving and falling growth rate of population, possibilities of vigorous acceleration of the economic growth were also contained in these relationships.

Thus, so to say, the society has not taken the benefit of the strength of a family based social system, which lies essentially in the economic sphere. The essential weakness of this institution lies in the indifference it generates about the health and nutrition aspects, and correspondingly, in the high mortality rate it induces.Therefore, in a way, a remedy of these weakness adds to the economic strength of the system. To this extent, the policy priorities are also implicit in the system itself.

There is another weakness of the system which should be brought out in this context. It is the effect of a high population growth rate on the environment and the ecology. Moreover, with limited land resources a large size of population would invariably deplete the non-renewable resources quickly, making the life of the future generation untenable in the future. In itself, the above could be a sufficient ground for population control in India. As a logic it has great validity within the Indian institutional framework.

CHAPTER XII

PROBLEM OF HUMAN RESOURCE DEVELOPMENT IN THE RURAL SECTOR*

Introduction

Notwithstanding, a long experience of modern industrial activities, India was grossly underdeveloped at the time of Independence. The per capita income at the time of Independence was very low; but most importantly the bulk of the population was dependent on low productive agriculture and household-based industrial activities. The first population census after Independence (1951) recorded that as many as 70 per cent of the male workers were engaged in activities in the primary sector which included cultivation, livestock, forestry, fishing and hunting, mining and quarrying. The secondary sector provided employment to 11 per cent of male workers. The activities covered both large scale and small scale manufacturing and construction.

The Indian planners and policy makers tried to remedy the situation quickly so that a fair standard of living could be established in the country as early as possible. Thus a search was made for methodologies which could be expected to bring about the change in the shortest possible time.

Fifties of this century was a period of intense research in the aspects of development of backward societies. The researches were carried out mostly in the West, as a part of the analysis of the growth process. The backward societies raised special issues in this context. Because of lack of balanced economic opportunities population of these societies became dependent primarily on agriculture leading to excess pressure on land. There was an apparent overpopulation in these societies, with economic activities yielding no social surplus which could be invested for improvement of the productive capacity of the basic resources. The Western thought identified capital formation as the engine of growth,

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whereas in these backward societies there could be no surplus for supporting growth. Thus, need was felt for evolving separate methodologies for the backward societies.

Methodology adopted by India for bringing about rapid economic development followed strictly the course of discussions in the above area. India has been, particularly after Independence, one of the intellectually most sensitive countries in the world. All policies were developed strictly on theoretical considerations. The following discussions bring out the results of the policies adopted in the country for improving the economy, and thus in a way, constitute an evaluation of the theoretical basis of the policies. More importantly, the consequences of the policies have been traced, not as theoretical exercises, but from considerations of the effect these policies have on the future of India.

The Ideas Behind Indian Policy Structure

Ideas concerning economic growth and development crystallized around theories of growth formulated by Harrot and Domar. The essential feature of this theory was that the growth of national income was proportional to the growth of stock of capital in the society. Thus, the main instrument for bringing about steady growth of income in any society was identified as capital formation in the societies. The relation of proportionality implied that the rate of growth of national income would be as much as the rate of growth of stock of capital in the societies.

The above relationship was adopted in the discussions as a general rule. Therefore, for the development of backward societies also it was felt that a high rate of growth of capital stock could be essential for bringing about rapid improvement in the standard of living.

Extent of capital formulation in these discussions was shown to be dependent in each year on the extent of saving the community was capable of generating in each year. The extent of saving was also shown to be determined by the difference between the community's income and the part of the income used for day-to-day consumption. In Western societies it was found that a given positive proportion of the annual income is saved by the community. For these societies, therefore, a steady growth of national income annually could be visualized.

For the backward societies, on the other hand, things were found different. Principal economic activity in the societies was agriculture and since the land area under control of these societies did not increase whereas population kept on increasing over the years and since

agricultural technology had, not improved, not only the entire agricultural output was consumed but also there was increase of underemployment and steady deterioration of standard of living. Thus, these societies without any positive capital formation remained totally stagnant. It was also realized that there could be no immediate relief from this situation as these societies did not possess the basic force for inducing economic growth.

Thus, it was felt that for these societies there was need for the new strategy which could ensure a regular generation of savings for capital formation. An answer was found in development of a segment of economic activity which had a relatively large labour productivity. It was argued that with a large output per man in these activities and with a low wage per man the surplus per man would also be high which could be used for reinvestment. The amount of reinvestment thus obtained could then constitute an extent of capital formation for inducing growth of the economy.

It was argued that with a large under-employment in the agriculture a shift of workers from agriculture to the new segment of the economy did not reduce the production of overall wage goods in the society so that in the extreme case it might always be possible to ensure employment in the modern segment at subsistence level wages. Lewis who formalized these discussions in a neat theoretical model allowed a level of wage in the modern sector slightly above the subsistence level available the traditional sector. It followed that so long as the wage remained dependent on the productivity in the traditional sector which was very low the modern sector with a high level output per man could be expected to yield high level of surplus per man.

It followed from the discussions that the reinvestment of the surplus of the modern sector in the modern sector itself with its high level of output per man could be expected to lead to significant rate of growth of activities in this sector. It also followed that the overall growth of economy could then be dependent on the extent of transfer of workers from the traditional sector to the modern sector without affecting the total output of the traditional sector. Since the output per man could be much larger in the modern sector than that in the traditional sector, the overall growth of output per man would depend upon the rate at which the proportion of labour in the modern sector increased. Moreover, as the real wage rate could be bound by the subsistence level, such transfer could also be expected to increase the surplus per man, and thus the rate of saving and the rate of growth progressively.

In a second line of discussion during the fifties, on the aspect of development of backward societies, issues of choice of technique were raised. Keeping regard of the large supplies of labour and the scarcity of capital in these societies, points were being raised about the appropriate choices of techniques for producing goods. It was understood that alternative techniques were available for producing different goods, and that, therefore, the issue of choice was real. It was also understood that the market price ratios in these societies did not fully reflect the prices which could be established under perfectly competitive conditions. In these circumstances the techniques justifiable by market relations could not be expected to be appropriate ones in relation to the broad social objectives. Therefore, real case existed for developing a priori the appropriate techniques and for selecting those.

In general, the alternatives could be classified as capital intensive or labour intensive. With a large supply of labour and relative scarcity of capital, use of labour intensive techniques, for production of goods has an immediate appeal. Goods are produced in any case, and at the same time unemployment is relieved in consequence, need for which is unquestionable in the Indian circumstances.

It was, however, noted that the techniques which use less capital per unit of labour also yield less output per unit of labour. Thus given a rate of wage, such techniques would also provide less surplus per unit of labour. In the extreme case, when the capital is very thinly employed per unit labour, the output per unit of labour could turn out only as much as the wage rate, yielding no surplus at all. In such a case further growth is arrested as no resources for investment is generated. Thus unqualified support for labour intensive techniques is not possible.

As the output per unit of labour increases with use of more capital per unit of labour, the surplus per unit of labour also increases consequently, given a rate of wage. The total surplus would, however, be determined by the total number of labourers employed, which would be smaller the larger is the capital per unit of labour, given a quantity of capital. In effect, it is possible to determine the array for total surpluses which could be expected from a given quantity of capital, on the basis of the different levels of capital intensities associated with the alternative techniques. The technique which yields the maximum surplus for a given level of capital, or that yields the largest rate of profit on capital has evidently greater potentials for inducing growth. Such techniques, are evidently capital intensive and are associated with large scale manufacturing processes.

Both types of arguments led to the suggestion that fostering large scale manufacturing processes are justified for rapid industrial and economic development in the backward societies. It came to be understood that allocation of maximum investment in such activities could be expected to provide opportunities for absorption of labour employed in low productive traditional activities quickly. It was also understood that as in a choice between allocation of investment in modern and traditional activities, advantages lies in choosing the former, therefore, in the transitional phase the traditional activities should only be held as resting places for those who could not be shifted to modern activities. This also followed that since the programme involved substitution of traditional activities by modern activities quickly, there was no need for improving the traditional activities.

India's plan for economic development was built fully on these ideas. The essential stress in the Second Plan, which was the first rigorously developed programme, was on the growth of public sector enterprises and development of basic and heavy industries for manufacture of capital goods. In order that the capacity of the capital goods sector could grow quickly a definite programme was also developed for apportioning a large part of the annual output of capital goods to reproduction of capital goods again. In this way, efforts were made to restrict the flow of current output of machinery towards production of consumption goods, and thereby the aggregate level of consumption.

In effect, the second plan of India, represented a concrete and operational representation of the theoretical ideas which were crystallizing during those days. The traditional sectors agriculture and household industries—played a crucial role in the order of things. By remaining traditional, it continued to be the basis of employment and survival for a large fraction of the population. Secondly, it satisfied the aggregate consumption needs of the population so that the bulk of the output of modern sector could be invested for expanding the modern sector progressively.

Prof. Mahalonobis, who developed the basic model for Indian plans, was explicit in these regards. He stated that the basic strategy of planning in India should be, on the one hand, to increase investment in heavy industries, and, on the other, to increase the supply of consumer goods by increasing investment and production in small and household industries to meet the new demand. He further added that until employment is brought under control there should not be therefore any fresh investment to expand factories which compete with the small and household units of

production. In respect of agriculture also it was held that industrial development was not possible without an increasing supply of cheap food and raw materials, and that, however, in the short run a good deal of the supply should be achieved by intensive cultivation by hand and by improving conditions of living in rural areas through community projects, and reform, consolidation of holdings, village cooperatives, etc.

Programme of Human Resource Development

A manpower developmental programme was formulated in keeping with the industrial objectives and priorities. The Planning Commission appointed in September 1955 an Engineering Personnel Committee to make an overall assessment of technical personnel needed for sustaining the country's programme of development. The important terms of reference of the Committee were:-

1. to make assessment of shortages of supervisory and higher grades of engineering personnel anticipated at the end of the Five Year Plan.
2. to estimate the probable requirements of engineering personnel of supervisory and higher grades for implementing the Second Five Year Plan in the principal fields of national development such as building and road construction, railways, industrial development in the public and private sectors, mining, irrigation and power etc;
3. to review existing facilities for practical training in industrial establishments, including apprenticeships and to recommend measures for their expansion in cooperation with the industry.
4. to make such other recommendations as may be essential for ensuring adequate supply of engineering personnel for the next fifteen years with particular reference.to the immediate requirements of the Second Five Year Plan.

The terms of reference given to the Committee clearly bring out how the mind of the policy makers were working. The manpower developmental programme was fully framed to supplying appropriate manpower for sustaining the emphasis on the large scale industrial activities. The pattern was set during the second plan itself. Intake in the

degree level engineering courses, which was around six thousand during 1955-56 was raised to 15 thousand in 1961. In respect of the diploma level engineering courses the intake, which was around 10 thousand during 1955-56, was raised to about 28 thousand in 1961. Compared to intake in the engineering courses, the intake in agriculture (degree level course) and veterinary college in 1961 were about six thousand and one thousand respectively.

Remarkable improvements were made in the sphere of training of craftsmen for the industrial establishment. In the early forties the government initiated a scheme of training technicians, for the ordinance factories. A number of technician centres were started. These centres were retained for training of ex-serviceman for their rehabilitation. In the fifties, considering the need for trained craftsmen for rapid industrialisation these centres were named Industrial Training Institutes and given responsibility for training craftsmen for meeting the requirements of factories.

Associated, as it were, with the training of ex-servicemen, the admission in the Technician Centres steadily declined with the passage of time. These centres offered two types of courses- engineering and non-engineering trades. In 1954 the admission in the engineering trades came down to less than one thousand from 8 thousand in 1951. In the same year the admission in the non- engineering courses was slightly less than two and a half thousand. Thereafter, the programme for industrial development, under the new conceptual framework started. The number of Industrial Training Institutes was increased rapidly. There were 55 schools in 1954 and it increased to 162 in 1960. In that year the admission in engineering courses were more than 30 thousand. By 1980 the number of schools were increased to 356 and the admission to 133 thousand. During 1954-1960, on the other hand, the admission in the non-engineering trades remained nearly steady.

General school education programme was also reorganised. The old matriculation education was reformed. The duration of secondary course was increased first to 11 years from the original ten, and then to 12 years. Basic science subjects like physics, chemistry and modern mathematics were included under the core programme so that a necessary background could be formed for further technical education of the products of secondary education.

In effect, the entire manpower development programme, including formal educational programme, was tied to the programmes and priorities under the economic plans. The economic plans emphasised the

expansion of the large scale manufacturing processes alone, and this emphasis was fully reflected in the manpower developmental programme so that the expansion of the large scale manufacturing processes did not suffer on account of manpower shortages.

An essential slant of this human resources developmental programme was its total urban bias. The large industrial facilities which are available only in the urban areas. Thus, the training centres get located in the urban areas, or in the new urban centres which spring up around the big manufacturing establishments.

The manpower developmental facilities were open to both rural and urban population, but since modern economic activities were located only in the urban areas, and since, moreover, manpower developmental programme was tied to the modern activities only, the rural population after education and training required to move to urban centres for employment. The training could be useful only in the framework of employment in the modern sector, and therefore, the movement to the urban areas was inescapable for avoiding unemployment.

Facts in Relation to Policy

The Indian economic plans were drawn for rapid improvement both of aggregate output and output per person so that poverty and unemployment could be removed. Both objectives were to be met by expansion of large scale manufacturing activities, with its high level of labour productivity, and transfer of population from low productive traditional activities to large scale manufacturing. The overall growth were to the accelerated steadily through increase of rate of saving.

The rate of saving increased from seven per cent to 23 per cent during the last 30 years. However, the rate of growth of output remained steady, on the average, at 3.5 per cent per year. In other words, the planned acceleration in the rate of growth did not occur.

In the context of this paper the effect of the policies on the structure of employment, about which strong expectations were made, is more important. This matter is discussed below.

The Indian economic developmental programme was basically urban based, and consequently, an immediate reflection of the changes should be seen in the urban/rural distribution of the population. In particular, the transfer of population from low productive traditional activities to high productive activities of the modern sector should involve also a shift of population from the rural to the urban areas. The proportion of urban

population in 1951 was 17 per cent. It increased to 18 per cent in 1961 and to 19 per cent in 1971. In the 1981 census count, the urban population was found 22 per cent. Thus, a reasonable shift was been evidenced only during the last decade, whereas during the first two decades the change was marginal.

Great significance should not be the attraction, from the side of consideration of changes of employment structure, on the recorded change of the urban population. The growth of employment in the urban areas during 1971-1981 was of the order of 43 per cent. During 1961-71 the growth was of the order of 40 per cent, which was only slightly lower than the growth during the last decade. There is, therefore, no basis for the belief that urbanization increased during the last decade due to an increase relatively to the earlier decades, of employment opportunities in the urban areas.

The above rates have been estimated on the basis of counts of male working force provided in the population census records. In India, the definition of workers adopted for classification of population by the census, changed from census-year to census-year. The change of the definitions affected the count of female workers primarily. This for comparison between decades, count of male work force has only been used.

The economic policies were framed so as to draw workers away from low productive traditional activities of which agriculture was the most dominant in India. The entire logic behind the developmental policies rested on the assumption that not only the agriculture in India way low productive, but also ridden with huge surplus labour, capable of transformation into industrial capital without any social cost. Thus the industrial development could be easily associated with steady decrease of the proportion of workers in agriculture.

In 1951, census count, 69.4 per cent workers (Male) were employed in the activities of agriculture, forestry, hunting and fishing in India. Up to 1971, the proportion of workers in these activities remained the same. The proportion decreased to 66 per cent in the 1981 count. The proportion of workers in the activity of manufacturing and repairing was 8 per cent in 1951. In 1961 and 1971 counts the proportion was recorded as 10 per cent. In 1981 the proportion increased to 12 per cent. There is, therefore, an evidence of a small transfer of workers from agriculture to manufacturing over the last 30 years of India's planned development.

The effective transfer occurred only during 1971-81. The transfer, however, did not follow the path envisaged in the policy frame. The

policy emphasised the large scale manufacturing processes which were expected to draw the surplus labour, whereas during this decade, the proportion of employment in the organised/large scale segment of the manufacturing sector decreased, notwithstanding, the vigorous growth of employment in this sector. In 1971 employment in the organised manufacturing establishments was about 28 per cent of the total employment in the manufacturing establishments. In 1981 the share of organised manufacturing employment declined to 24 per cent.

Effect on the Rural Economy and Society

Rural economy in India was never wholly agricultural. In a way, it was a complete economy, and all forms of economic activities which were needed for supporting the social life in the rural areas were conducted there. There was a variety of non-agricultural activities like production of textile articles and transport equipment; metal processing and manufacture of agricultural tools and implements and household utensils; construction, leather, carpentry, poultry and glass and ceramic work In 1951 six per cent of the rural workers were engaged in manufacturing and repair activities, when at the national level the proportion was eight per cent in these activities. Most of these activities were conducted as household activity.

Up to 1971, there occurred very little structural change in the Indian economy. As the proportion of rural population had not changed materially by that time, it followed that the effect of industrialization at the urban areas remained confined to the urban areas only. On the other hand, since development in the rural areas was deliberately neglected, the economic conditions of the rural areas deteriorated steadily.

Small internal changes occurred in the character of the rural economy as reactions to changes in the urban economy. For example during 1951-61 agriculture suffered heavily as the policy did not emphasize direct investment in agricultural development. However, the pressure on food supply kept on building up due to rising tempo of investment in response to which agricultural activities in the rural sector began to improve.

Thus during 1961-71, the proportion of workers in agriculture increased. The increase occurred through reduction of the proportion of workers in the manufacturing and processing activities . The change in the proportion was inevitable, as in the absence of technological improvement diminishing productivity of labour in agricultural had set in strongly.

The immediate impact of the above change in the rural economy was a disintegration of the household-based manufacturing activity. The proportion of workers in the manufacturing and processing activities declined, and more importantly, the absolute number of workers in household-based manufacturing and processing activities decreased.

The household-based manufacturing activities in the rural areas were organically linked with the other rural based activities through various form of social relationships. The new economic and social programmes instituted after independence brought about radical changes in the structure of economic relations in the country as a whole, with the centre of gravity of the economic system moving towards the urban areas. This change in the economic relations also induced changes in the social relations so that the previous organic relations in the activities of the rural areas were destroyed. In the process, the crucial role played by the rural manufacturing activities in the rural economy was lost.

On the other hand, the role of the household-based manufacturing activities envisaged in the plans, as the basic supplier of manufactured consumer goods for the entire economy, did not also materialise.

The situation is most easily revealed in the data on occupational distribution of the Indian rural workers. The Table below presents the number of persons in traditional non-agricultural occupations in 1901, 1971 and 1981 and the proportion these formed of the total workers and total population in those years.

Table 12.1

Number and Per cent of Persons in Traditional Non-agricultural Occupations in the Rural Areas (1961, 1971, 1981)

(Absolute figures in thousands)

Items	1961	1971	1981
1. No. of persons in non agricultural (traditional occupation)	11,360	8,099	9,990
2. Total number of workers	162,246	144,782	176,433
3. Total Population	360,300	439,046	525,393
4. Traditional non-agricultural workers as per cent of total workers	7.00(%)	5.59(%)	5.66(%)
5. Traditional non agricultural workers as per cent of total population	3.5(%)	1.84(%)	1.90(%)

Source: Census of India

The occupations taken into account are: weavers, knitters, dyers and related workers; tailors, cutters, furriers and related workers; leather cutters, listers, sewers and related workers; metal based workers and other craftsmen and production process workers; precision instrument makers, watch makers and jewellers; carpenters, joiners, cabinet makers and related workers; bricklayers, and construction workers; potters, kilnmen, glass and clay formers, and related workers; millers, bakers, brewmasters and related workers; barbers, hair dressers and related workers; launders, dry cleaners.

The Table brings out clearly the decline in the significance of the traditional non-farm occupations in the rural areas. In the past little more than three persons were taking care of the needs of the services provided under the above occupations of 100 persons. In 1981 less than two persons were available for 100 persons. Between 1961 to 1981, there definitely occurred increases in the need for services which the people of the above occupations provided. The improvement in the agricultural activities, and other activities, in the villages called for additional non-farm based services. Since the productivity of these occupations did not improve at all, the increasing demand for non-farm based services should have attracted more persons in these occupations, while, as a matter of fact, people deserted the occupations.

Persons in these occupations, in proportion to the total rural workers, also declined during this period. In 1961, seven per cent workers in the rural areas, belonged to traditional non-farm occupations. In 1981, the proportion declined to less than six per cent.

The decline of significance has been real, and has not appeared due to changes in the definition of workers made at the time of 1971 Census. It is well known that the definitional change affected the count of female workers primarily and not the male workers. The decline is evident when only the male workers are taken into account. In 1961, male traditional non-farm workers were 6.94 per cent of the total male workers in the rural areas. In 1981 the proportion declined to 5.94 per cent. In fact, percentage-wise the ratios were the same for total workers and male workers.

The situation is not fully reflected in the changes expressed in terms of figures in percentages. It is evidenced from the Census figures that there has also occurred decline in the absolute number of persons in the traditional non-farm occupations in the rural areas. In 1961 there were 11.4 million workers in the occupations. In 1981 the number of persons counted in these occupations was 10 million. Most decline in absolute

terms occurred in the occupation of weavers, knitters and related activities. In 1961 there were about 3 million workers in the occupation which decreased to about 2 million in 1981.

A significant proportion of workers in this occupation was female. It is possible, therefore, that a part of the decline could be associated with change the definition of workers. Taking the male workers in this occupation there was a slight increase in the number of workers in this occupation.

Absolute decline was also evident in many other occupations. These occupations are—leather cutters, sewers etc., metal base workers; precision instrument makers, jewellers; potter, kilnmen etc., millers, bakers and beverage workers; launderers, drycleaners and pressers. Among these, taking the male workers alone, decline is evident in the occupations of leather cutters, sewers etc., metal base workers and laundry, drycleaners and pressers. The male workers were nearly the same in the occupations of precision instrument makers and jewellers; potter, kilnmen and related workers; and barbers, launderers.

The decrease in the number of workers in traditional non-farm occupations should not be interpreted as a transfer of workers from low productivity activities to high productivity activities. Up to 1971 the proportion of the total workers in agriculture increased in the rural areas and there occurred no increase in the proportion of non-farm workers among the total workers. Therefore, the decline in the proportion of traditional non-farm workers in the rural areas should be associated with increase of the proportion of the total workers in agriculture which was not a high productive activity.

During 1971 to 1981 there occurred a decline in the proportion of agricultural workers and a small increase in the proportion of workers in manufacturing activities. It is, however, known that the share of workers in the small scale activities in the manufacturing sector only increased during this period so that the transfer could, at the most, be believed to have occurred from traditional non-farm activity to small scale activity in manufacturing sector. As the wages paid in these sector has always been very low this movement of the traditional non-farm workers could not be identified with a movement for the better. In effect, the entire set of data reflect merely the fact that the condition of traditional non-farm workers deteriorated steadily after Independence in the country.

A Basic Lacunae

Traditional non-farm activities are conducted in the Indian rural areas in the framework of self-employment. In the villages individual families are associated with different activities and the responsibility has passed on from generation to generation. The skill formation also occurs within the family through learning on the job. Therefore, over the years there could occur very little technological changes in the conduct of these non-farm activities in the Indian rural areas.

As a result, the productivity of labour in these activities also remained very low and did not show signs of improvement over the long period of time. Within such technological framework, however, almost all needs of non-farm products and services were met in the village. Within this household production framework there were, however, possibilities of significant technological development. For example, there could occur changes in the materials used leading to greater diversification of products and better products. There could be improvement from this side in the area of leather products, textiles products, metal products, clay, and ceramic products. Uses of modern tools, implements and instrument could improve the range of products. Similarly, there could be uses of mechanical and electrical power where manual labour was the basic source. There could have opened up uses of power driven tools and implements, in metal processing area, carpentry and food processing. Uses of modern tools or implements, together with, uses of better and modern inputs could have raised the output per head per unit significantly.

In effect, a modest investment and provision of training and relevant information could be expected to bring about significant improvement in the productivity and income of the rural non-farm workers. On the other hand, neither the human resource developmental programme nor the national investment programme ever concerned with the improvement of the productivity of the rural non-farm workers.

Contrarily, the overall programmes of development in the country acted heavily against the interest of these workers. The rural artisans in the past produced and supplied all forms of agricultural implements and tools, utensils, shoes and footwear, textile products and similar other things for domestic use. The development of stainless steel and plastic products, mill made garments and clothes, and shoes made of leather and artificial materials, have, on the other hand, made the living of the artisans in the rural areas exceedingly difficult. Since, modest

improvement of technology, including utilisation of different and better inputs, could have taken care of the needs of varied and sophisticated products in the rural areas the post independence period have become only calamitous for the traditional non-farm workers in the rural areas. Thus, are observes a steady decline of the share and size of traditional non-farm workers in the rural areas.

On the other hand, as the activities were conducted in the framework of self-employment there could be a tremendous urge for rural artisans to acquire training for higher productivity and to bring about necessary changes in the technology all of which depended on uses of simple but advanced tools and implements. It would also have been easy to induce them to assuming the additional responsibilities since that would have been nearly the progress in a traditional role.

In their traditional role these artisans operated both as skilled workers and small entrepreneur. In a significant way they were the parallel in India for the class of mastercraftsmen of England before the industrial revolution. As is known the industrial revolution in England got off only after the mastercraftsmen broke the shell of the domestic system and emerged as the new brand of entrepreneurs. India possessed in ample measure the seeds for such a transformation which ultimately did not germinate for want of nurturing. In recent years the Government of India has adopted the TRYSEM programme for training the rural unemployed youths for setting them in self-employment. The programme does not cover the youngmen belonging to the families of the traditional non-farm workers who could use the knowledge for improving the productivity of the household enterprises. On the other hand, the persons taking the training did not possess the appropriate background and social relationships, they needed for succeeding in self-employment in the rural areas. Within the existing social framework this could be difficult, particularly, when the traditional enterprises were themselves in difficulty. Thus one finds that the TRYSEM programme did not expand self employment opportunities in the villages and only led to searches of job by the trained persons.

Conclusion and the Issue of Human Resources Development

Escape from poverty in each society has, ultimately, to be sought at the plane of individuals and not at national plan . An individual is necessarily under pressure for establishing a means of livelihood for mere survival. Thus he seeks a salaried job, or assumes self-employment or

finds opportunities in family holdings. The return he gets depend upon the asset holding, his personal capabilities and the operational technology for production of goods and services. Given the asset holding, his income is proportional to his capabilities and the operational technology. He is poor because in both these regards he suffers inadequacies. Thus answer to his poverty is only in the removal of the two inadequacies he suffers.

In the Indian context, with very small opportunities for salaried employment in service-centred establishments, where only income is indifferent to output, the above answer is both necessary and sufficient. Nothing else matters, least of all, the aspects of income redistribution. The income per head, on the average, is less than one hundred rupees per month. With equal distribution of income, every one will remain below poverty line, drawn meaningfully.

In India, the above is particularly true because a very large fraction of the population survives through self-employment. For these persons the income is directly proportional to personal capabilities and operational technology. The operational technology, in the framework of Indian household economy, depends in part on the tools and implements in use, but mostly on availability of information about the various alternatives for doing given jobs. As the selection of tools and implements depends on the above information, the operational technology turns out wholly proportional to knowledge possessed by the individuals.

Thus poverty in the Indian economy is totally related to the quality of human resources; and its removal is only a matter of human resources development, which has been utterly neglected in the context of the Indian rural economy. In the villages the people have invariably occupations by tradition, and these occupations are conducted under self-employment. These persons, therefore, require first a knowledge about the alternative ways of conducting their occupations which have greater productive potentials, and second, a training by which they could be capable of following the alternative way. In almost all cases, such a programme of education and training would be able to bring about radical improvement in the income possibilities of the rural artisans. As there is occurring a steady improvement in other areas, particularly in the area of agriculture in the rural areas, any issue of demand for the additional products which would thus result would also be irrelevant.

CHAPTER XIII

INDIA 2001 AND NATIONAL MANPOWER*

India and its population are poor. The poverty in the society is ubiquitous and multi-dimensional, so much so that it is never possible to index the poverty by working out the proportion of the population on the two sides of an imaginery poverty line. Poverty in India is visible all round. It is evident from the appearance of the population. One rarely sees a healthy person, most are emaciated, frail and sickly, some are fat and obese. The clothes which cover these bodies are usually dirty and of poor quality and should have been discarded long ago. One sees, so to say, life, made up of undeveloped bones and covered by lustre less skin and pieces of dirty clothes, as evidence of a living population. The life is also a fickle phenomena. Hundreds of children die immediately after birth, many die within five years of age, and the average mortality rate for men, women and children is very high.

Environment and surroundings are also equally dirty. Every public place, public transport, public office are shabby, nasty and poor in all regards. The construction is poor; the maintenance is poor, and most are put in services much beyond their reasonable life. The metropolitan cities are full of slums; other towns are slightly better than slums but without civic amenities. The villages and country sides are worse than slums; without roads, water, sewerage facilities, and most other essentials of a corporate life.

Even the institutions of the Government presents a shabby and dirty look. The appearance inside and outside the public offices, whether in the remote region or in the capital cities including the capital city of

* Adopted from a paper by the author entitled: India 2001 and National Manpower Information System. The paper was presented in a Conferenceon Industrial India 2001 and National Manpower Information System, March 27-28, 1987, Bombay (Vol. I of its proceedings).

Delhi, is the same. The college and the university premises in Delhi and other cities, the secondary schools in the towns, the primary schools in the towns and villages present uniformally shabby and dirty appearance. The men, boys and children inside the office, schools and colleges also present similar dirty and uncared for appearance.

The roads in all parts of the country are badly constructed and badly maintained, and these with the huge but shabby and sickly population continuously jostling on them, and with the shabby and ramshackle vehicles plying on them, present a terrifying appearance.

The country has a large animal population, as poorly nourished, as the human beings who are their owners. Most of these are economically unproductive for no other reason than that they are badly nourished.

Poverty of India is not a matter to be read in figures, it is to be seen. There has not been, on the other hand a lack of concern for removing poverty of India since the British rule was set up in the country, as reflected in the establishment of an administration with primarily welfare objective. After the change of leadership of the Government with the independence of the country, the Government's welfare role has been expanded inordinately. The administration has proliferated beyond all bounds for conducting various forms of social welfare functions. Vertically, the administration has gone down to the village level, and horizontally hundreds of departments and organisations have been set up with the sole objective of improving the life and living conditions of the people.

Poverty in India and also in any society, when there are evidences of affluence elsewhere is an anachronism. Supplies of goods and commodities needed for relieving poverty in the society are obtainable in a simple manner. The basic input for all goods and commodities, is free gift of nature, i.e., the land including the forests, rivers the environment and other resources provided by the nature. The other essential input is the manpower and its capacity for transforming the natural resources into required kinds of goods and commodities.

The capacity includes the skill and knowledge, in virtue of which individuals can either transform natural resources directly to goods and commodities or indirectly by uses of tools, machinery and equipment. Both the direct and indirect methods depend upon human skill and ability and these differ only in so far as the indirect method has an initial time lag, if a society starts from a scratch. Labour and time have to be devoted for building up the initial stock of machinery and equipment. On the other hand, since the life of the society stretches infinitely, time lag has no

consequences and all the societies have the capacity to grow at a rate given by the growth of its labour input and growth of its abilities and capacities. The abilities and capacities are acquired through learning process, and this feature is independent of social characteristics. Thus from this side, and given the nature's gift, no society could have justification for not growing equally in per-person terms and for remaining poor for hundreds of years. The difference in the levels of per-person output in two societies at any point of time could also be corrected allowing for an appropriate time lag, dependent on the difference in the levels of equipment per-person. Thus in the course of time all societies have the capacity to provide equal income per-person.

In another 13 years, the 20th century would come to a close and we will enter the 21st century. For the last 40 years, the Government of India has been trying to improve the conditions of living in the society and yet the country is poor absolutely. Therefore, there can be no doubt that in the coming 13 years radical change in the conditions of poverty in the society cannot be expected. There is, therefore, also no doubt that we shall enter the 21st century in the same state of physical being as today.

Thus, the most that we can expect during the next 13 years could be forsaking all the forces and features which kept us arrested in the present state for such a long period. In a way, we should begin to think methods for closing the accounts of the 20th century so as to carry as little a burden of this century as possible and be free to usher in new ways for establishing a happy and prosperous life in the 21st Century.

Many countries in the past escaped poverty of the middle ages through industrialisation. It involved introduction of advance and productive methods for transformation of natural resources into useful goods; and employment of manpower in those activities. Both have gone hand in hand and led to wide diversification of activities and consequent provision of varieties of goods for enriching the life in a society.

India was introduced to modern industrial system very early and nearly at the same time as most countries, excluding England in the West. Quite frankly, the trend started in 1830s' when the East India Company's monopoly in all trade ended. Anglo-Indian merchants obtained as a result a unique opportunity to branch out from export trading into production for exports. They were also able to find support from London and Liverpool houses of finances as they provided reliable management ability to cope up with alien conditions.

Development of railways and the opportunities of extending the railway system in India in the middle of the 19th Century provided also

the essential fillip for development of industrial activities in associated areas. Thus, by the end of 19th Century, India already possessed a modern manufacturing segment, technologically as much developed as the associated activities were in most European countries. After the First World War industrial activities in the country diversified further, needs regarding which were strongly felt on account of the disturbed communication during the War. By the time Second World War occurred, India was counted as a regular industrial nation, and occupied a position among the leading industrial nations in the world in terms of total volume of industrial goods produced.

II

Industries in India were initially in the hand of Englishmen who had operated during the days of the monopoly of East-India Company as their trading agents. The capital for industrial investment had also come from England. Slowly an institution known as Managing Agency System developed out of the British Interests which were associated with the Indian Industrial Enterprises. In the course of time the Managing Agents freed themselves from the primary responsibility of providing capital for Indian enterprises. They, however, undertook to provide, the essential technical and managerial knowhow for operating the industrial enterprises, in lieu of which they were charging fees related to sales or profit of the enterprises.

In most cases the Managing Agency houses helped the establishment of complete industrial plants for production of given industrial commodities. With this services available, the Indian industrialists were only required to operate the industrial plants and ensure steady production of goods. In many cases, the Managing Agency houses also helped the Indian establishments in marketing their products, particularly, among other establishments under the control of respective houses. Technical knowhow for expansion and development and diversification of the establishments were also supplied by the Managing Agency houses.

Indian capital started entering into manufacturing activities from 1880's. They entered primarily textile areas initially, and thereafter branched in other directions. During and after the Second World War the Indian participation expanded. Most established Indian - controlled industries expanded like cotton, cement, paper and steel. Diversification in the areas of ferro-alloys, non-ferrous metals, diesel engines, machine tools, sewing machines, tea, textile and oil-processing machines, and railway equipment also occurred.

In sum, by the middle of the 20th Century and, in particular, at the time when the country become independent, India possessed a large and diversified industrial segment. In addition to this, by this time, essential financial institutions for supporting the industrial segment of the economy like banks, issues houses, capital market were also fully established. Institutions for resolving company affairs, labour disputes, safety and other requirements of factory and mining establishments and conditions of employment in organised activities had also developed. In particular, structure of an industrial economy and the infrastructure for supporting and sustaining the industrial economy were fully developed and provided an adequate model and basis for further expansion and diversification of the industrial segment of the country.

The organisation, however, left an essential feature. The factories, which were set up and were operating in India, were established on the basis of know-how obtained from other developed countries. This was true not merely in respect of the subsidiaries established by companies incorporated in other countries, but also of the factories set up as Indian enterprises with Indian capital under managing agency houses. In all cases, knowledge about the process technologies to be adopted for manufacturing products, the machinery and equipment and materials to be used for such purposes, the production and assembly schedule to be followed for production, the drawings and designs and tooling details were obtained from abroad. In addition to this machinery and equipment were also imported from abroad. Thus, in effect, local involvement in these activities were confined to operating the machinery and equipment as per the programmes developed as a part of the technical know-how obtained from abroad. For operating the establishments, the needs were felt only for skilled and trained workmen capable of operating the machines at one plane, and at another, for supervisory manpower for helping the workmen in the execution of their jobs.

In consequence of the above, there developed also institutional arrangements for training of manpower for working as operators of different forms of machines. Since the skill needed was related to specific machine and equipment, apprenticeship became the major institution for development of skill in the country. Secondly, the establishments needed merely supervisory manpower with a technical background for supervising the technical operators. The needs for technical supervisors were also met to a large extent through apprenticeship programme of advanced level. By and large, the British System of training under professional societies through apprenticeship and on-the-job learning programme was followed.

III

Indian intellectuals, under the influence of liberal and/or Marxian *ideology, associated Indian poverty with foreign domination political and economic. With Independence in 1947 the foreign political domination* was over and a national government was established. Efforts began to be made after Independence for ending the foreign domination in the economic sphere, exercised through the foreign capital invested in India.

Attempts for ending foreign economic domination were made from two directions. The Indian capitalists organised themselves for taking over the British interests. The bureaucrats and the socialists wanted to strengthen the public sector so that the commanding heights of the economy could be kept permanently under control of the state machinery.

In the above way control over the economy was fully established and the foreign economic domination was ended. The new control was shared among the private capitalists and the government and bureaucrats according to the Industrial Policy Resolution of 1956. Further growth and development of Industrial activities also followed according to the terms suggested in the policy resolution. The public sector expanded fast in the area of capital goods and basic metals, minerals and intermediate products. The private sector largely expanded in the area of consumer goods and light and medium engineering products.

The expansion was quite rapid. The number of factory establishments (registered under the Indian Factories Act) increased from 23 thousand in 1951 to 88 thousand in 1979. The employment in the factories during the same period increased from 2.5 million to 5 million. The employment in the railway increased to 1.6 million in 1982 from 0.9 million in 1951. The employment in generation, transmission and distribution of electric energy which was marginal in 1951 reached a figure of 0.7 million in 1981. Similar expansion also occurred in the areas of tele-communication, air and shipping transport, water supply, etc.

In the past, foreign economic domination also ensured as a by-product, the provision of technical know-how for the industrial sector. With the termination of the old type economic link with the British capital, the supply of know-how also ceased. Thus for sustaining the rapid industrial expansion alternate arrangements for supply of technical know-how became necessary.

Subsequent stages of development in this country have been pushed through, by what can be called technology transfers from the developed countries. Concretely, this has involved buying from established

manufacturers of different types of products the methods and processes for such production.

In most cases, the knowledge has been obtained by allowing Indian manufacturers to enter into collaboration agreements with the appropriate foreign manufacturers. The collaboration agreements sometimes involved merely transfer of knowledge; in some cases, it also allowed use of the brand names of the products turned out by the foreign collaborator.

In many cases, it was also permitted to appoint foreign firm or a technical group as a consultant for purpose of obtaining the essential technical know-how involved in production of goods. In all these cases, attempts were made either by the national collaborator or by the Government to ensure that the technology associated with certain processes or production is transferred in such a manner that production in the country can be conducted in the manner in which it is undertaken by the parent concern.

During the period 1957-1970, more than 3 thousand collaboration agreements were entered upon. More than 80 per cent of the agreements dealt with mechanical, electrical and chemical engineering areas. In particular, about 18 hundred agreements were made for developing facilities for production of heavy and light electrical equipment, industrial machinery, textile machinery, agricultural machinery, material handling and construction equipment, machine tools and instruments.

In effect, the technical services which the managing agents were providing in the past began to be obtained through collaboration with different manufacturers. The structure of the technical services were nearly the same. However, the dimension of activities for which such services were obtained became very wide so that the country could become industrially self- sufficient quickly.

IV

Therefo , in one regard, the change in the control of the economy which resulted from the transfer of political power had no effect on the structure of the economy. The country continued to build up its industrial productive capacity through knowledge and know-how developed outside the country. The capacity expanded and diversified in the process, as more collaboration agreements were made. The number of factories, the volume of output and variety of commodities increased. This also resulted in increase in the number of production operators.

V

During the last 40 years, there has however, occurred a significant diversification of India's Industrial activity. In particular, activities for producing varieties of machinery and industrial intermediate products, including basic metals, have been initiated. However, since in almost all cases the technology for the production of these goods were imported, the composition of manpower for producing the present variety of goods remained the same as the composition before Independence. In both cases, manpower have been used merely as operators of machinery and equipment. Therefore, notwithstanding, the extensive diversification of industrial activity the employment prospects only for electrical and mechanical engineers increased during these years.

In 1961 the traditional subjects of civil, mechanical, electrical, chemical and metallurgical together accounted for 83 per cent of the total stock of graduate engineers in the country. In 1981, these specialities covered 78 per cent of the total stock. More interestingly, the member of mechanical and electrical engineers as percentage of the total stock increased during this period. In 1961, the mechanical engineers were 21.6 per cent of the stock, and increased to 28.3 per cent in 1981. Electrical engineers were 17.6 per cent in 1961 and increased to 20.7 per cent in 1981. Among the other specialities only the share of tele-communication engineers increased during this period. The share of metallurgy remained constant. The share of all other disciplines decreased during this period.

Evidently, the character of the Indian economy did not change in the least after Independence, except the ownership pattern. The dependence of the country on import of technology and essential industrial output (capital and intermediate) has also increased steadily with expansion and diversification of industrial activity. Viewed from this side, it is also evident that the colonial type of dependence has really increased over the years.

Although the expansion in the past occurred only in the manufacturing segment, the Indian export continues to be based on primary products. The export of engineering goods did not increase materially, even the share of India in this trade has decreased.

The gain of the society, in per-person term, from the wide expansion and diversification of industrial activity was also restricted to the benefit derivable from the establishment of few units each year with relatively higher level of productivity. So to say, gain was associated only with the redistribution of work force in favour of activities with high level of productivity. As the increase of the share of such activities in the total

activities has been slow, the overall growth of productivity in the economy also remained very slow. With a constant work force participation rate, the growth of productivity and the growth of per capita income are equal. This, in a way, explains why the level of poverty over the years did not change materially in the country, notwithstanding, the great changes in the level of industrial activities.

Concretely, Indian method of productivity improvement amounts to establishment of productive units with relatively higher productivity level, by import of technical know-how. Things which are thus imported by India constitute the results of developmental activities of other developed countries.

VI

In the technical area various types of development might occur. There might be for example, (1) a development of new process technique for production of a given product, (2) a development or a process or technique for doing a thing which was not done earlier, (3) a development of a new product, capable of being produced in a given framework, (4) a development of a product and a process for producing the product, (5) a development of a product, for example, a machine, which may be used for improving the process of production of given products

These developments are engineered, and constitute a part of the output of the industrial system of the developed countries. The developments have two components - know-how and associated products - and in the transfer of knowledge from the developed countries movement of both these components is involved. Most importantly, a large part of the trade of engineering products in the world has been associated with the transfer of knowledge of technological developments. As the developments and the associated products raise the level of productivity, internally also these developments are rapidly adopted, leading to steady demand for progressive developments. In a way, the steady increase in the output of engineering products in the developed countries, and in the trade of these products, should be ascribed almost wholly to the progressive development in the technologies, and to the association of these products with technologies.

The data along these lines are available for India from the Degree Holders and Technical Personnel Survey conducted as a part of population census. The coverage of this survey was not 100 per cent, but as many as 863 thousand scientific and technical persons responded. It is observed from this data that out of the respondents about 23 thousand were employed in research activities, of which only about 2500 were employed in manufacturing establishments for research activities.

Data are also available separately for post-graduate scientists and engineering graduates. A total of 85 thousand science post-graduates responded in this survey. Seven thousand out of this, forming about 8 per cent, were absorbed in regular research; the number engaged in research in manufacturing sector was less than one thousand, i.e., about one per cent. The survey obtained responses from 111 thousand engineering graduates. Less than two thousand, i. e., less than two per cent, were recorded to be in regular research, and only about four hundreds, that is, less than 0. 5 per cent were engaged in research in the manufacturing sector.

The distinction between the structure of the Indian system and that of the Western developed societies is evident in the above discussion. The growth in the Western societies depended wholly on the impetus provided by the technological developments engineered by the establishments as a part of their industrial activities. Since technological developments have been essentially human creations, in a way, it can also be said that manpower has been the primary agent of growth in those societies. In India, on the other hand, manpower is employed as operators of machines which are used as the basic agent of growth. Manpower in this system is not called upon to contribute in the growth process the creative faculties which distinguish men from other animals.

This critical distinction between the two type of societies is not reflected in the data on industrial growth and output which are normally provided by the statistical agencies of the states. In the Indian data one would find evidences of activities of all sorts and it would difficult to distinguish the achievement of India in the Industrial field from the achievements of other developed countries. Nearly all types of industrial goods are produced in India, and in almost all areas, establishments would be found which employ appropriate modern and sophisticated technologies. Thus a perusal of this data, produces image of a vigorous modern economy. In the process one misses the weakness of the system, for example, one does not know that our own contribution in the output is not different from the contribution which any operator of record playing machines makes to music.

VII

Two things have been brought out in the above discussions. The first is that the colonial economic structure of the pre-independence days has been preserved ever after the Independence of the country. Moreover, the

intensity of dependence has increased significantly, and has been proportional to the expansion and diversification of the industrial segment. The expansion and diversification did not improve, in the least, the capacity of the economy to sell abroad the industrial products, whereas imports of the industrial products themselves increased significantly for sustaining the expansion and diversification of the industrial segment. Thus, as a result, the dependence on the export of primary products, including non-renewal resources, like ores and minerals, have increased. This has consolidated the colonial structure of the economy. On the other hand, rigid controls on imports of consumer products have been imposed. The controls have allowed in particular, inefficient units in the consumer goods sector, to prosper. This has also sustained the inefficient producers of standard industrial inputs and small machinery and equipment.

The second is that during the entire period no attempt has been made to develop the institutions which allow the exercise of growth-inducing faculties of manpower. It has been believed wrongly instead that a late starter in the industrial development programme can always benefit from the knowledge developed elsewhere and avoid the efforts and expenditure associated with research and development. For forty years the country acted with this belief, and the result of this has been described in detail in the earlier pages.

Significantly, the use of Indian manpower as operators and drivers only and of foreign manpower as store of knowledge and creative capabilities, reflects more pertinently the extent to which the colonial dependence of the pre-independence days consolidated over the years. Conceptually, India should be called self-sufficient and self-sustaining only when responsibilities for growth and development of the society is borne by the Indian manpower. However, up to the date, our programme of human resources development, and the institutions for employing human resources do not bear out significant effort in these directions. On the other hand, it is inconceivable that India could be treated as self-sufficient and self-sustaining with a manpower that only follows mechanically instructions developed elsewhere.

Thus the burden of economic dependence, notwithstanding the changes in the ownership pattern, has become onerous and is totally creepling the economy. As a programme for closing the 20th century, it would be worthwhile to make efforts during the remaining years of the century to shake this burden off. This would enable us to begin the 21st century, unfettered and therefore, capable, of reaching our destination quickly on our own.

Operationally, this involves, among others, (1) putting on Indian manpower greater trust and confidence than has hither to been done, and (2) developing institution and arrangements whereby Indian manpower could be used as agents of growth and development. This involves, so to say, bringing man to the centre of economic events.

All the above should be taken as essential programmes for the remaining years of the 20th century. In effect, the changes implicit in these programmes would only complete the process of transfer of authorities to the Indian population, and would make them emerge in the 21st century as the creators of their own destiny.

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OTHER BOOKS OF INTERESTS

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